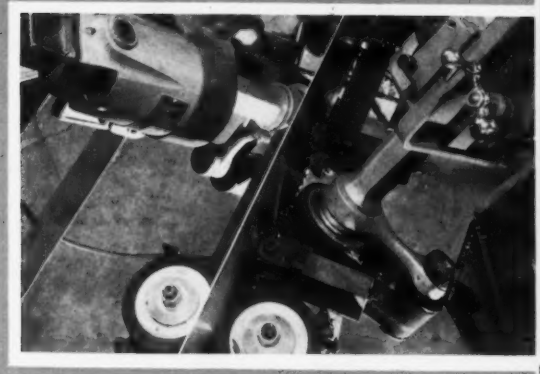
OCTOBER • 1958

# Metal Products Manufacturing



## Serving the Appliance and Fabricated Metal Products Industry







## When a fine finish counts

*specify Shell Chemical products for surface coatings*

If you make surface coatings—protective or decorative—you'll find the answer to both quality and economy in solvents and resins from Shell.

Shell's family of *solvents* meets or exceeds highest standards, providing complete formulating flexibility. For resistance to abrasion, impact and chemical attack, Shell's *Epon® resins* are proving unsurpassed in a wide range of coating applications.

And, in the manufacture of alkyd resin and ester gum coatings, Shell *glycerine* assures both quality and performance.

For information and technical literature on specific products to solve your specific needs, write to:

**SHELL CHEMICAL CORPORATION**
CHEMICAL SALES DIVISION

• Atlanta • Boston • Chicago • Cleveland • Detroit • Houston • Los Angeles • Newark • New York • San Francisco • St. Louis
IN CANADA: Chemical Division, Shell Oil Company of Canada, Limited, Montreal • Toronto • Vancouver

**Acetone**
**Bisphenol-A**
**Diacetone Alcohol**
**Di-tertiary-butyl Peroxide**
**Epon® Resins**
**Ethyl Alcohol**
**Ethyl Amyl Ketone**
**Glycerine**
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**Methyl Isobutyl Carbinol**
**Methyl Isobutyl Ketone**
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**p-Tertiary-butyl Benzoic Acid**
**Secondary Butyl Alcohol**

SHELL

# Give Your Product New "Sales-Appeal" with Versatile Armco Stainless Steel

Nothing says *quality* quite so clearly to your customers as Armco Stainless Steel. Its excellent resistance to corrosion and heat, plus high strength and lasting beauty, make your product more durable, more salable.

Add to this the fact that Armco Stainless Steel offers you almost unlimited design possibilities—it can be drawn, formed, spun and finished to meet your individual requirements.

Armco Stainless Steels are available in a wide variety of special or standard grades and shapes. To find out more about what Armco Stainless Steel can do for you, clip and send the coupon today.

New steels are born at Armco

ARMCO STEEL CORPORATION, 318 Curtis St., Middletown, Ohio

I want to know more about Armco Stainless Steel. We manufacture_____

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COMPANY _____

STREET _____

CITY _____ ZONE _____ STATE _____

## ARMCO STEEL

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

# MPM

(including finish)

MONTHLY TRADE PUBLICATION

Established January 1944

*Published by*

DANA CHASE PUBLICATIONS

York Street at Park Avenue, Elmhurst, Illinois
Telephones • TErrace 4-5280 • TErrace 4-5281

NEP BPA

**OCTOBER • 1958**

**VOL. 15 • NO. 10**


## FEATURES



## DEPARTMENTS



**METAL PRODUCTS MANUFACTURING**

*FROM RAW METAL TO FINISHED PRODUCT*


**A trade publication** devoted to the interests of the metal products manufacturing industry with special editorial attention to home appliances. The editorial scope covers design, engineering, market and statistical information and technical and practical information on plant facilities and all phases of manufacturing "from raw metal to finished product." Free controlled circulation to top management, purchasing, engineering and key plant management and supervision in metal product manufacturing plants. To others, subscription price is $8.00 per year, domestic. To all other countries $10.00 per year (U.S. funds). Single copies, $1.00.

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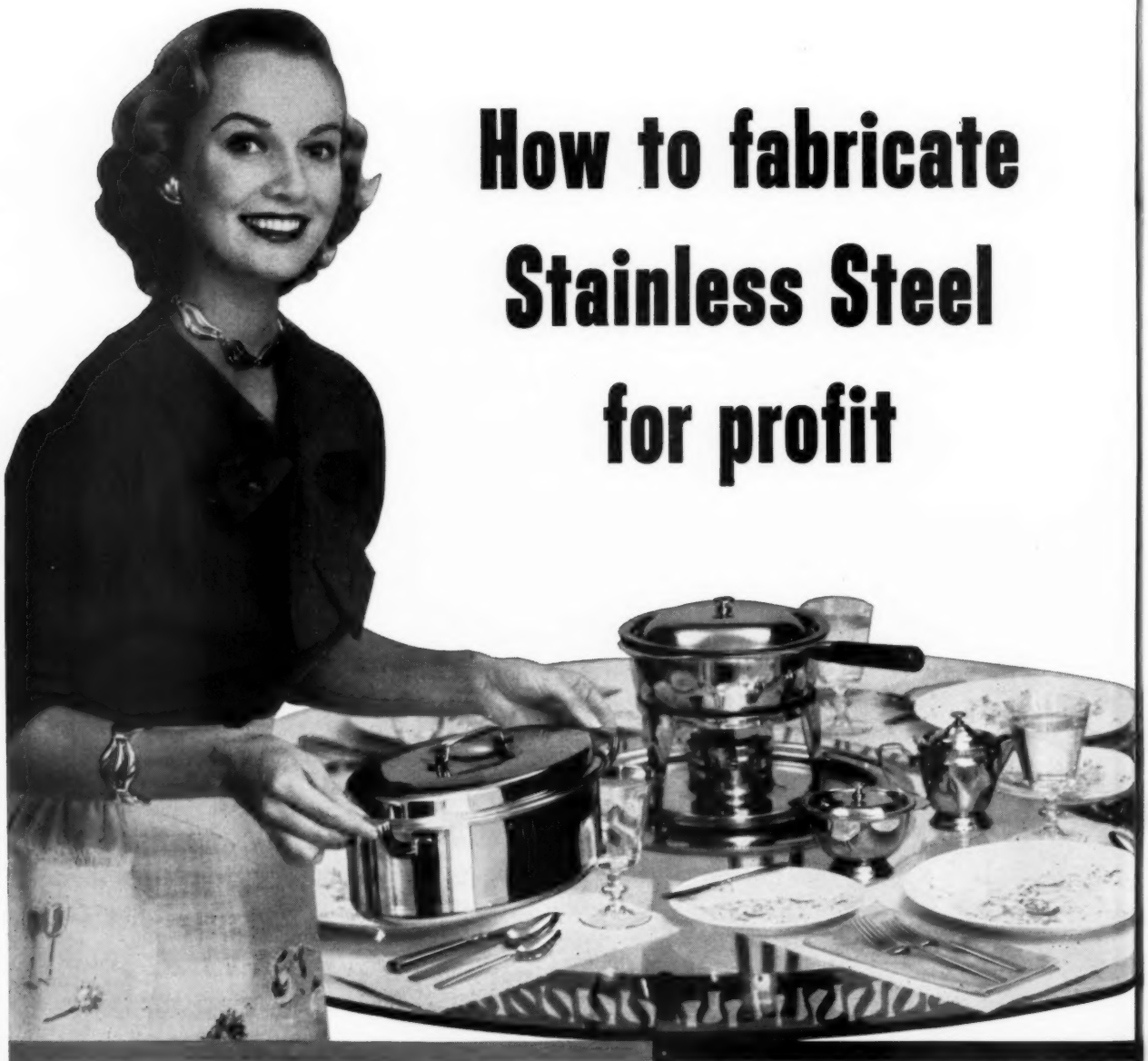
Accepted under the act of June 5, 1934 at Aurora, Illinois authorized January 7, 1948.



# How to fabricate Stainless Steel for profit

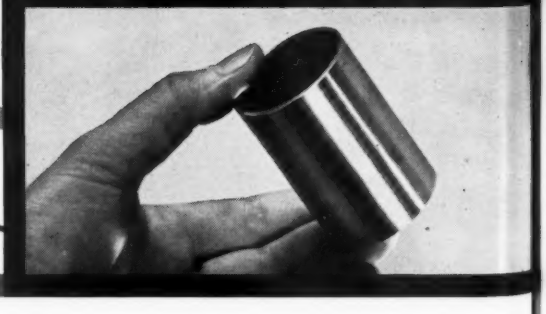


**REPUBLIC ELECTRUNITE® STAINLESS STEEL TUBING** improves sales and profits for appliance manufacturers. A simple 2½-inch bearing liner for an automatic washer made of ELECTRUNITE tubing provides greater true concentricity. There is no need for buying a heavier wall and then spending more money to remove stock. ELECTRUNITE can cut costs, improve the quality and performance of your products. Send coupon for details.









It may be easier than you think, even in today's highly competitive market, to turn sales resistance to sales insistence. How? Build into your product all the sales potential of stainless steel.

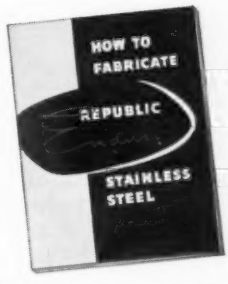
Your customers recognize stainless steel as a sign of quality . . . and stainless is so easy to sell. It doesn't tarnish; resists rust and corrosion; has no applied surface to chip, peel, or wear away. It's easy to clean and keep clean. Stainless is always bright, all ways right.

With the use of this aristocrat of metals your product will have eye-appeal, buy-appeal, and built-in sales advantages never before experienced.

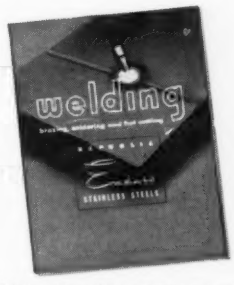
The key to successful stainless steel fabrication is in practical know-how, in knowing the characteristics of the metal and how they affect various operations. All the information you need on how to fabricate stainless steel for profit—the proper design and use of equipment—is contained in the three books shown below: "Stainless Steel in Product Design," "How to Fabricate Republic ENDURO Stainless Steel," and "Welding Republic ENDURO Stainless Steel."

Why not get started in high profit, stainless steel fabrication. Republic metallurgists and engineers will assist you in selection, application, and processing of ENDURO Stainless Steel. There's no obligation. Get the facts, mail the coupon today.

"Stainless Steel in Product Design" is a comprehensive 40-page book, outlining, in detail where and how to use stainless steel so that it more than justifies its slight additional cost.




"How to Fabricate Republic ENDURO Stainless Steel" contains 36 pages of detailed text on all phases of stainless steel fabrication. Photos show you step-by-step procedure.




"Welding Republic ENDURO Stainless Steel" is a 54-page, 2-color book containing approved and complete technical data on welding, brazing, soldering, and hot cutting of stainless steel.

# REPUBLIC STEEL

*World's Widest Range of Standard Steels and Steel Products*

**REPUBLIC CONTINUOUS GALVANIZED** steel sheets provide inexpensive, long-lasting, corrosion protection. The uniform, tight zinc coating won't crack, peel, or flake off under the most rugged fabrication. Complete products are positively protected without the expense of individual hot dip galvanizing after forming. Write for facts.

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**DEPT. MG-5681R**
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☐ Have a Stainless Metallurgist call

Send a copy of:
☐ "Stainless Steel in Product Design"
☐ "How to Fabricate Republic ENDURO® Stainless Steel"
☐ "Welding Republic ENDURO Stainless Steel"

Send more information on:
☐ ELECTRUNITE Stainless Steel Tubing
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Address_____

City_____ Zone___ State_____

## INDUSTRY MEETINGS

### PAINT AND VARNISH

The thirty-sixth Annual Meeting of the Federation of Paint and Varnish Production Clubs, and the twenty-third Paint Industries Show, Cleveland Public Auditorium, Cleveland, Ohio, October 5-8, 1958.

### GAS ASSOCIATION

The American Gas Association's 40th Annual Convention, Atlantic City, N. J., October 13-15, 1958.

### PACKAGING

Packaging Institute's 20th Annual National Packaging Forum, Edgewater Beach Hotel, Chicago, Ill., October 13-15, 1958.

### PACKAGING, HANDLING, SHIPPING

Thirteenth Annual Packaging, Handling, and Shipping Show, (Society of Industrial Packaging and Materials Handling Engineers) Coliseum, Chicago, Ill., October 14-16, 1958.

### ELECTRICAL ENGINEERS

American Institute of Electrical Engineer's Fall General Meeting, Pittsburgh, Pa., October 27-31, 1958.

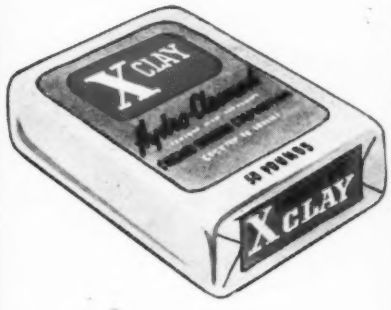
### METAL EXPOSITION

American Society for Metal's 40th National Metal Exposition and Congress, Cleveland Public Auditorium, Cleveland, Ohio, October 27-31, 1958.

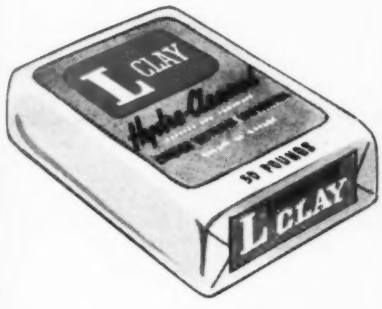
### ELECTRICAL MANUFACTURERS

National Electrical Manufacturers' Association's Annual Meeting, Traymore Hotel, Atlantic City, N. J., November 10-14, 1958.

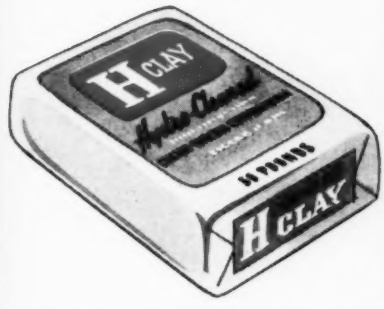
# Chicago Vit HAS A CLAY FOR EVERY NEED




**X CLAY, Air-Floated** — X Clay has superior suspending properties and good workability. It produces excellent set and is widely used in ground coats because of its outstanding draining characteristics and bubble structure. It is also recommended for use with antimony cover coat frits, imparting high opacity.




**L CLAY, Hydro-Cleaned** — A clay with good suspension and set characteristics imparting good workability in titania opacified cover coats. It produces improved color, gloss and acid resistance.




**H CLAY, Hydro-Cleaned** — H Clay has medium set characteristics. It has good workability in white cover coat enamels producing a medium bubble structure and opacity, and high gloss. It is often used with X Clay in ground coat enamels, and this combination is particularly advantageous for use in alkali resistant gray ground coats. It is well suited for use in lower firing as well as in conventional type enamels.


**Q CLAY, Hydro-Cleaned** — Q Clay is outstanding for dipping cover coat enamels where low set and high suspending power are desired. It provides excellent particle distribution during the dipping operation which results in a tight set with less tendency to double drain and assures a smooth texture.


**A CLAY, Hydro-Cleaned** — A blend of clays imparting outstanding scum resistance . . . an excellent clay for use in dark colored enamels. It is particularly compatible with oxides . . . provides good opacity and luster to opaque cover coat enamels. It has good suspending properties and develops average set permitting the use of relatively high specific gravities in enamel slips where this quality is desired for spraying.


**D CLAY, Air Floated** — A low bubble structure clay recommended for bright colored enamels. It gives excellent results in blue and black cover coats. Its suspension and set characteristics make it equally well adapted for use in both sheet steel and cast iron enamels.

We've learned a lot about clays for enameling over the past 40 years. Perhaps the most significant fact is that no one clay is suited for every use. The clay you use in your enamels should be one which has characteristics most suited to your product, the operating conditions under which your product is made, and the frits you use.

The study and development of clay blending and clay performance is one more unheralded service of the Chicago Vit research and development laboratories. The over-all result is simply this: You can demand and get from Chicago Vit a clay that has been blended to impart particular characteristics that assure you of better enameling results and higher quality in your finished products.

You will find it advisable to discuss clays with your Chicago Vit representative. He will be pleased to recommend those most suited to your needs.

FOR FINEST FRIT

Chicago Vitreous CORPORATION

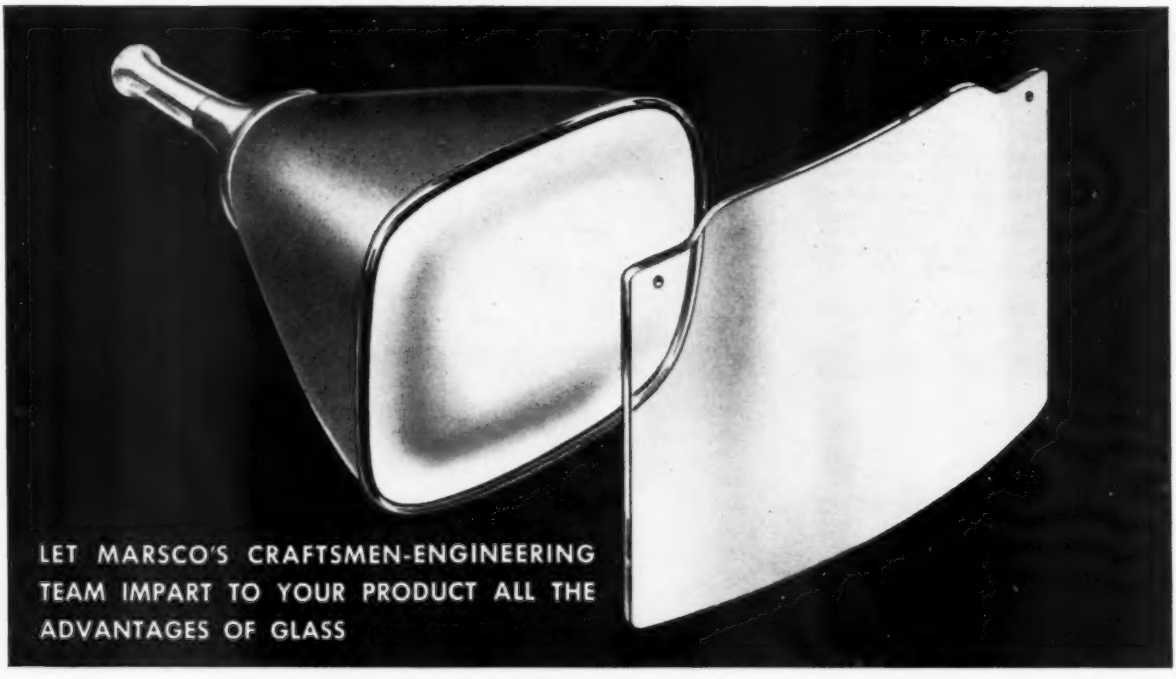
A Division of the Eagle-Picher Company

1425 South 55th Court, Cicero 50, Illinois

1918-1958 • 40 years of Service to the Porcelain Enamel Industry

# MARSCO

## for the Finest in PRECISION GLASS PARTS!




Join the television and appliance manufacturers who are now enjoying extra sales from the appeal and prestige contributed thru the luster of glass. Glass will enhance the beauty and broaden the acceptance of your product. It can be hardened, heat-treated or tempered to survive your consumer usage unscathed.

***Here are some of the applications for Marsco heat-treated, tempered and hardened glass parts:***

**•CLOCK & TIMER CRYSTALS •OVEN DOORS •RADAR EQUIPMENT •AIRCRAFT ACCESSORIES •PHOTOGRAPHIC EQUIPMENT •LIGHT LENSES •DIALS & NAME PLATES •TELEVISION EQUIPMENT •INSTRUMENTS •MEDICAL EQUIPMENT •BACKGUARD GLASS FOR RANGES •LAMP GLASS •SHELVING**

***Special Shapes for: Instruments, Gauges, Household and Industrial Appliances.***

Marsco


**MARSCO MFG. CO., 2909 S. HALSTED ST., CHICAGO 8, ILL.**

## There is no substitute for stainless steel

### in homes and home products

For the lady in the kitchen or the "chef" at the outdoor grill, there is nothing like the gleaming efficiency of Stainless Steel. Everything made of Stainless Steel has lasting beauty and is so easy to keep clean. No other metal contributes so much to better living.

Specify McLouth high quality sheet and strip Stainless Steel. McLouth Steel Corporation, Detroit 17, Michigan.

# McLOUTH STAINLESS STEEL

# GENERAL ELECTRIC . . . another user of PERMA-VIEW WINDOWS

ROUND

RECTANGULAR

SQUARE

TRAPEZOID

*We can manufacture any shape, any size, any thickness to meet your engineering requirements. Alternate methods of attachment may be used.*

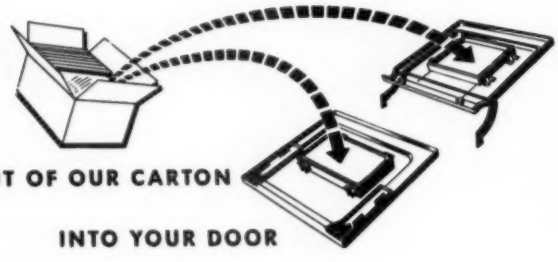
**GENERAL ELECTRIC CO.**

**—one of the**

**73 leading range manufacturers**

**using**

**PERMA-VIEW oven-door windows**



**OUT OF OUR CARTON**

**INTO YOUR DOOR**

General Electric Co. has been a satisfied user of PERMA-VIEW windows for a number of years. Now 72 other leading manufacturers are using "the window you can see through always."

The strong, steel-encased, double-pane PERMA-VIEW window incorporates the finest quality heat resisting glass. It is mechanically sealed to prevent infiltration of vapors and to eliminate "fogging." This "No-Fog" window meets the constantly growing demand for "visible baking."

The PERMA-VIEW window is pre-engineered and comes to you ready for immediate installation in your range, "out of our carton into your door." Let our specialized production lines serve as a part of your sub-assembly facilities. Phone or write us for complete details on the ease and economy of adding this sales feature to your new ranges.


**MILLS PRODUCTS INCORPORATED**

1015 WEST MAPLE ROAD • WALLED LAKE, MICHIGAN

# Idea! ... aesthetic functionalism

## with H&K perforated metals.....

The perception of the Industrial Designer and other men of ideas, in the selection and adaptation of aesthetically interesting and functionally honest mediums, is constantly proving the versatility of H&K Perforated Metals.

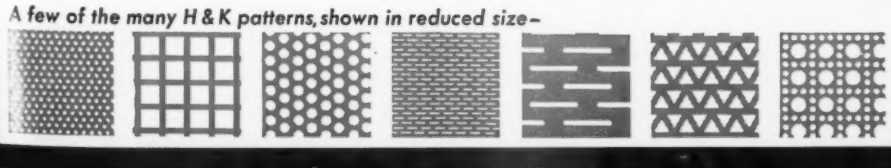
For more than 75 years, Harrington & King has helped to broaden the horizons of industrial design through the imaginative creation of unlimited patterns in both metallic and non-metallic materials. The appropriate design for almost every application can be selected from our thousands of existing dies . . . at no charge for tooling. Or, if necessary, tools for special designs will be built to order.

*Product Development by William M. Schmidt Associates

H&K sales engineers will be pleased to work with you on your perforating requirements

**Fill in and mail coupon to nearest H&K office**

*A few of the many H&K patterns, shown in reduced size–*



THE **Harrington & King** PERFORATING CO., INC.

Chicago Office and Warehouse
5649 Fillmore St. • Chicago 44

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☐ GENERAL CATALOG
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COMPANY_____

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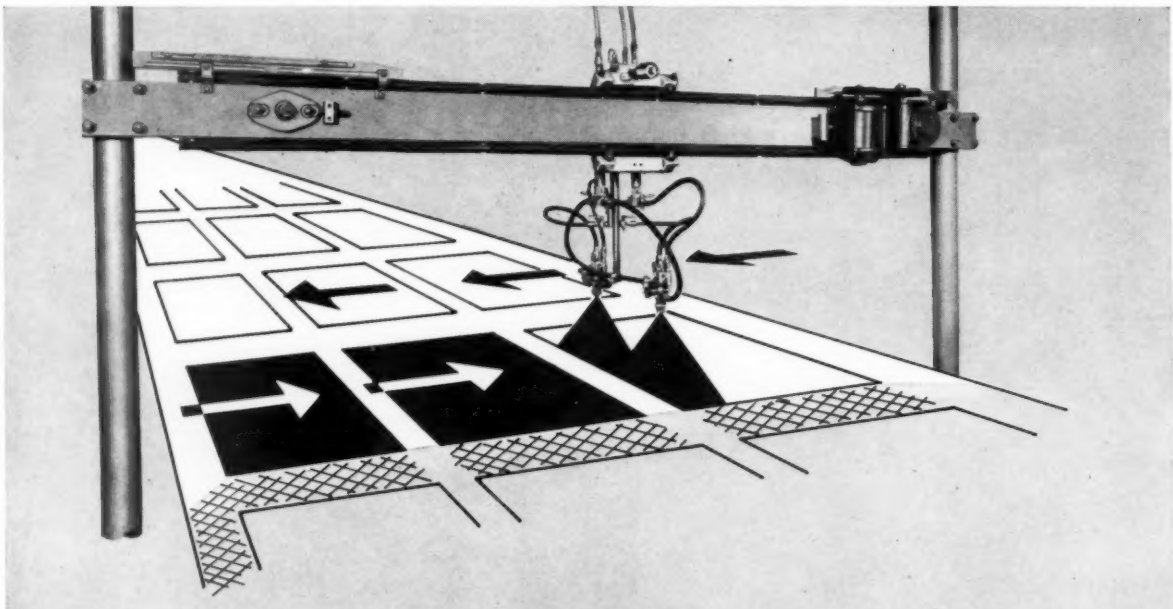
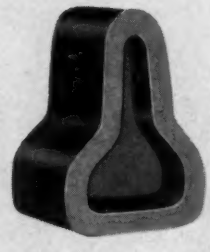
# DeVilbiss Automatics...a cost-



DeVilbiss Automatic Spray Machines, in three basic types, feature speed of application and uniformity of finish not possible by any other coating method.

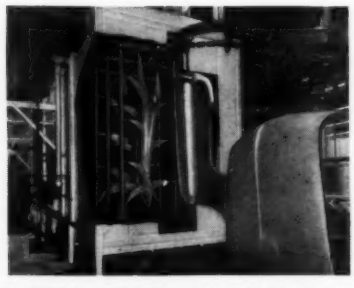
1. Automatic Transverse Machines coat flat or contoured shapes—from wall board to auto bodies—on horizontal or overhead conveyors.

2. Automatic Rotary Machines spray all types of small shapes with ultra-fast-drying materials—from lighting fixtures to miniature railroad cars.

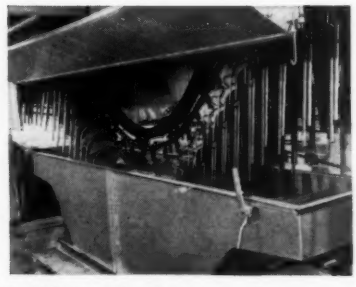


3. Automatic Chain-On-Edge Machines will spray all types of irregular shapes inside and out—from electric coils to glass bowls, bowling pins.

**DeVilbiss Spray Guns.** Complete range of models for maximum efficiency for all production requirements. *Send for Catalog IE-E.*



**DeVilbiss Flo-Coaters.** Save manpower and floor space in prime- or single-coat applications. *Write, stating requirements.*



**DeVilbiss Dip-Coaters.** Engineered to meet your layout and process. Paint is agitated, filtered. *Write, stating requirements.*

# saving answer to coating problems

## You can increase rate of production, improve quality of your work, and reduce costs to fraction of manual methods!

Complete mechanization of your coating applications with DeVilbiss Automatics helps you eliminate variation of manual operation, and boost your production—in many cases, 500% or more.

With DeVilbiss automatic spray, gun positions and angles are precisely set to coat your product quickly, uniformly, with accurate lapping, minimum overspray.

Think what this precision means to you in efficiency, speed, and over-all savings! Far greater uniformity of the spray-applied film; assured uniformity of color, luster, and texture of finish. Use of your materials is carefully established and maintained. Your rate of production remains constant. Interruptions and slowdowns due to operator fatigue are eliminated.

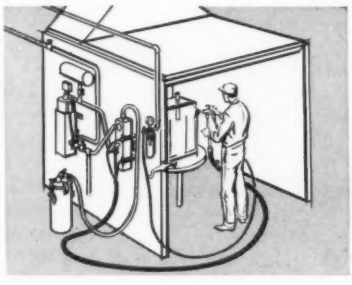
What's more, you can know in advance, without charge, the exact economies you can derive from coating with DeVilbiss Automatics. We will test-run your product and simulate your operating conditions at our fully equipped DeVilbiss Laboratory.

The results of these tests are sent to you, without obligation, for you to determine whether painting your product automatically is practical and economical.

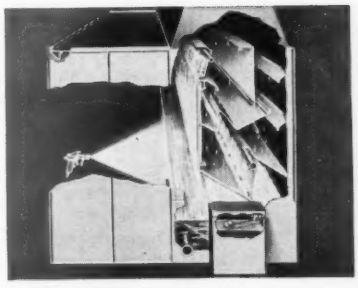
Remember: You enjoy a big advantage dealing with DeVilbiss, the only one-source designer and manufacturer of complete engineered finishing systems or individual components in the industrial-coating field. Call our nearest branch office; or write us direct for Series I-8000 Bulletins on automatic spraying.

THE DEVILBISS COMPANY, Toledo 1, Ohio • Barrie, Ontario • London, England • Branch Offices in Principal Cities

DEVILBISS



**DeVilbiss Hot Spray.** Provides heavier film build, with faster drying, less overspray, and fewer rejects. *Send for Bulletins IE-114B and F-286.*



**DeVilbiss Spray Booths.** Over 700 standard models provide efficient paint trapping for each individual job. *Send for Catalog I-7000.*

**DeVilbiss Fluid Hose.** Unsurpassed for resistance to solvents, oils. Flexible, kinkproof. Full line of connections. *Send for Catalog IE-E.*

## from the Editor's Mail

### She's in the contest now

The following letter dated September 5, was received from the West Coast following the receipt of the September issue of MPM:

Gentlemen: This letter is in reference to the photograph of our O'Keefe & Merritt Washer-Dryer Combination and Mrs. Pat Breithaupt, in the September issue of the MPM magazine in connection with the MPM "Mrs. Home Laundry Queen" contest.

There has been an error, as Pat Breithaupt is married and has been for a period of three and one half years. She is an employee here at O'Keefe & Merritt as secretary to the Vice President and Director of Sales. She has been with our company for a period of three years.

**Very truly yours,**
**O'Keefe & Merritt Co.**
**Advertising Dept.**

Ed. Note: We know that married girls are quite often referred to as "Miss" in business offices, and this may have been responsible for the error in the original information sent on Mrs. Breithaupt. The photo appearing in the 12th Annual Special Section devoted to the Home Laundry Appliance Industry and appearing as the center section of our September issue of MPM will most certainly be placed with other contest photos for consideration by the contest judges.

### Our error

Gentlemen: Thank you very much for sending me a copy of the August issue of MPM. Your treatment of the article "Family products service — a $16 billion business — and growing," Page 58, August MPM, seems very satisfactory to me. However, I do wish to call your attention to the fact an error was made in the first sentence. I quote, "push it over $30 billion by 1957." Written in that manner, of course, it does not make sense. A transposition of figures occurred as I made the statement that this could occur by 1975.

**Robert S. Geran, General Service Manager**
**Kelvinator Division, American Motors Corp.**
**Detroit, Mich.**

Mr. Geran is so right. A check of the editorial evidence file shows this to be an error in type setting that was not caught by proof readers at our printer or at MPM. Eds.

### Comment by Mr. E. P. Van Scoyk,* assistant chief engineer for Frigidaire

There has been a lot of conversation and discussion in dealer meetings recently concerning quality. Quality is affected by two things. One is a matter of manufacturing quality and control of manufacturing processes and operations. The second is a matter of design quality. It is Frigidaire's basic principle that neither manufacturing nor design quality will be sacrificed in their products.

This was dwelt on at some length by Mr. Herman Lehman, our general manager and vice president at the preview meeting in Toronto at the time refrigerators and ranges were introduced.

Engineering and design show a compromise. In order to satisfy all conditions of performance, features, manufacturing, and tooling, it is necessary to have many compromises in a product design. However, one compromise we have not made is a compromise on quality.

*MPM staff photo of Mr. Van Scoyk appears on Page HL-18 of Special Home Laundry Section in September MPM, in connection with feature "Simplify controls, improve drive mechanism on Frigidaire washer." Eds.

# PAINT REMOVING COMPOUNDS BY KERNS

PAINT REMOVAL PROBLEM?

FREE: A complete description of the general types of paint strippers — including a stripper selection chart.

This 5 page paper gives recommended uses and case history information on various types of paint removing compounds. Send coupon for your FREE copy.

**L. R. KERNS COMPANY**
**2659 E. 95th**
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**Subsidiary Plant**
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*Offices in Principal Cities throughout the U.S.A.*

**L. R. KERNS COMPANY**
**2659 E. 95th Street, Chicago 17, Illinois**

**Please send me my FREE copy of "Paint Removing Compounds" with stripper selection chart.**

*Name*_____
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*Company*_____
*Street*_____
*City*_____ *Zone*_____
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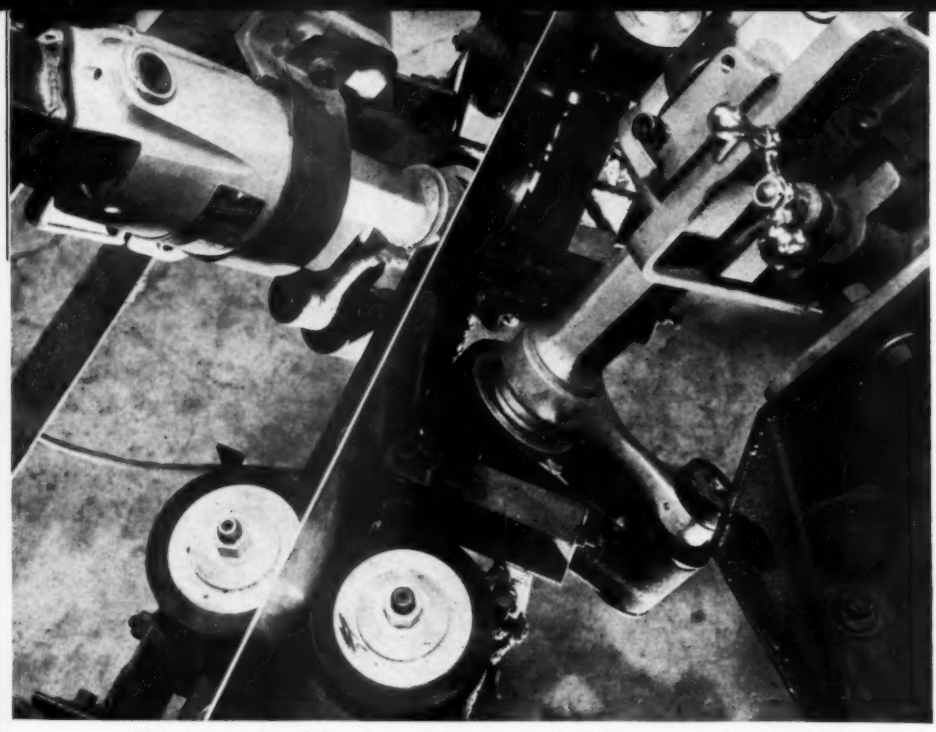


*This is an edge deburring machine comprised of two standard portable electric grinders equipped with 3 inch wide abrasive belts, (aluminum oxide, resin bonded, cloth, grit 80) which are adjustable so wear is even across the belt face. Machine has pinch-roll feed, and can handle various sized pieces.*

PHOTOS COURTESY MINNESOTA MINING AND MANUFACTURING CO.

# Custom fabrication of stainless steel

## coated abrasive belts and discs simplify metal finishing of welds

WHETHER it's a 5½-ton milk drier for a research project or a 50-pound carrier for radioactive materials, stainless steel products from Krueger Fabricating company have one thing in common: a fine finish.

The milk drier — 46 feet high and eight feet in diameter — is installed in the dairy research department of the University of Wisconsin at Madison, home of the Krueger Co.

The carriers, designed to be handled by two men, are bound for nuclear test centers in the West.

For jobs such as these Krueger depends on coated abrasive belts and discs to produce the specified finish.

The firm's history (this is its fortieth year) and present work schedule indicate that it is a custom fabricator rather than a mass production organization — although when large quantities of a fabrication are ordered (such as is the case of the radioactive material carriers) a production line can be set up immediately.

A great deal of the production line's versatility is due to use of portable equipment. Even a stroke sander (which uitilizes abrasive belts) has been mounted on a movable scaffold, so that it can be put into use in any part of the plant on short notice.

### Diameter eight feet

The reason for mobility and versatility is best illustrated by a close look at the giant milk drying tower. The total weight was 11,000 pounds, the overall length was 46 feet, and the body diameter was eight feet — with a cone at one end having an 11-foot-diameter flair closing to a one foot aperture.

The drier was fabricated from 11-gauge #304 stainless steel, which was

*Type C coated abrasive discs, grits 36 and 60, are used to cut down and even—up corner welds prior to finishing with abrasive belts. Here the operation is performed on a milk cooling tank.*

*A small rubber, serrated contact wheel of 50 durometer is used here with a 1 inch X 12 inch abrasive belt (aluminum oxide, cloth, grit 120) to finish an ID corner weld in a milk cooling tank prior to buffing.*

purchased with a number 4 finish from a Chicago steel warehouse.

To smooth interior welds, 2" x 20" aluminum oxide resin bonded cloth belts, grits 60 and 120, were used on portable air grinders equipped with 50 durometer contact wheels. On the outside diameter, welds were smoothed with grit 100 7" x 7/8" Type C discs, and the areas were subsequently blended with a greaseless compound and wick buffs. Abrasive sequences were developed in cooperation with the abrasive belt supplier.

The total fabrication time was 60 days, at a cost of about $30,000. This particular tank was built to specification for a dairy research program; however, Krueger design engineers envision uses for similar types of products in other parts of the food industry, such as coffee processing, and other industries dealing with detergents, ink, chemicals, and the like. Stainless steel products have a great many properties which make it ideally suited to jobs in these fields, according to Krueger personnel.

In fabricating milk cooling tanks, which in some respects are a production item, Krueger employs the tungsten inert gas welding process with a giant machine that can be operated manually, semi-automatically or automatically.

**Welds planished**

After the tanks have been welded, the welds are planished, or rolled, to improve physical characteristics and relieve stresses prior to grinding. The rolled weld provides easier grinding and finishing practices.

Weld removal on the tanks is accomplished with grit 36 and 60 discs, followed by finishing with grit 100 Type C discs. Other portions of the tanks are touched up with 1" x 12" abrasive belts, aluminum oxide mineral grit 120, which are also used on inside corner welds inaccessible for discs.

Following grit 100 or 120, pocket buffs are used for "roughing", and the area is blended with a cotton wick buff.

This process — the planishing, the medium-grit weld finishing, and the pocket and wick buff sequence — produces the finishes necessary to pass stringent dairy regulations in the various states. This is, too, the process used in every major Krueger fabrication.

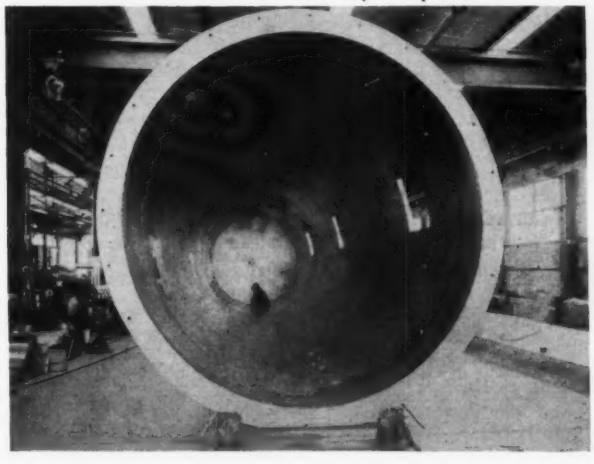
## SUMMARY OF COATED ABRASIVE APPLICATIONS

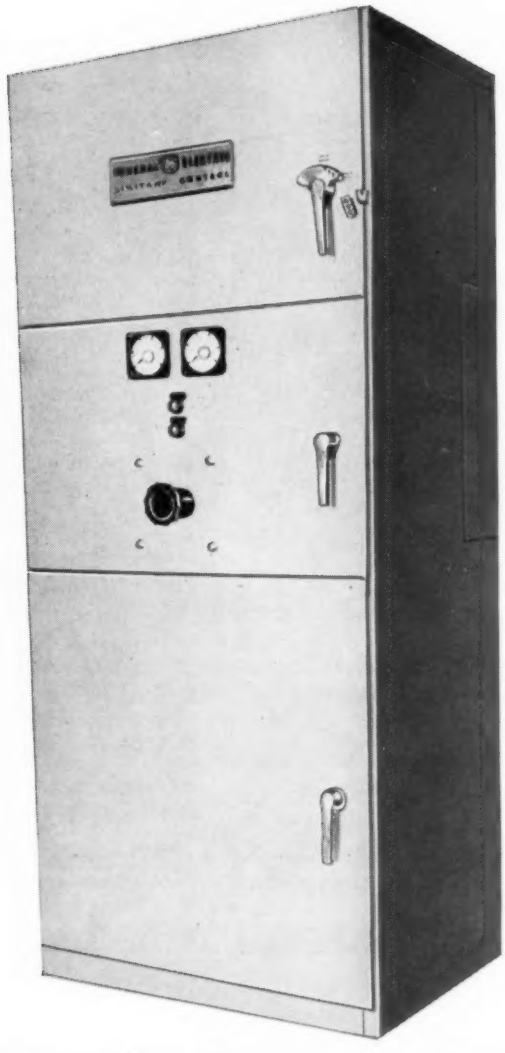
**Krueger Fabricating Co.**

| TYPE OF EQUIPMENT | COATED ABRASIVE EMPLOYED | OPERATION |
|---|---|---|
| Portable Belt Sanders (air driven) | 1" x 12" and 2" x 20" grit 120 aluminum oxide cloth belts, running over 50 durometer contact wheels, slotted. Belt speed is 6000 SFPM | Blending inside and outside corner welds on stainless steel tanks, and other SS fabrications |
| Portable Disc Grinders | Type C discs, 7" x 7/8", aluminum oxide Resinbond construction | Corner and side welds following planishing; and in some instances on cold rolled steel fabrications |
| Stroke Sander | Various belts, size 4" x 168" running at 6000 SFPM | General panel work; surface conditioning and preparation |
| | Example: Production paper E weight, open coat, grit 36 | Leveling 1/4" stainless plate (slice lip for papermaking machine), with .002" tolerance; piece 20' to 25' long; 2' wide |
| Bench Backstand | 2 1/2" x 60" aluminum oxide resin bonded belts, grits 36, 60 and 120 | General shop use; maintenance |
| Portable drills | Aluminum oxide resin bonded cloth cartridge rolls | Corners and areas which are inaccessible to belts and discs |
| Edge Deburring machine | 3" belt: aluminum oxide resin bonded, cloth, grit 80 | Deburring edges of stainless steel pieces prior to using them in fabrication |

*Following cutdown with grits 36 and 60 coated abrasive discs (Type C), and finishing with grit 120 abrasive belts, this corner weld and lip of tank are blended with a wick buff and greaseless compound.*

*Dwarfed by the giant 5 1/2-ton milk drier, this Krueger production man uses coated abrasive belts on portable grinders to smooth welds prior to final buffing. At far end, drier cone narrows to one foot aperture.*





**G-E LIMITAMP CONTROLLERS** offer users coordinated control for high voltage motors, 2300-4600 v, up to 3000 hp. They are ideally suited for the control of squirrel-cage, synchronous, wound-rotor and multi-speed motors on power systems requiring high interrupting capacity for maximum short-circuit protection.

## ACP Dip Granodine Process has improved finishes, cut rejects materially on control enclosures

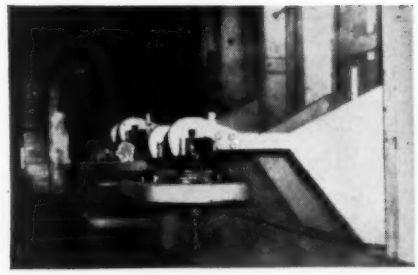
The Industry Control Department of General Electric Company, Roanoke, Va., was looking for an improved method in finishing the steel cabinets and framework for its various control enclosures, such as the Limitamp* panel shown above. An improved prepaint method was needed in order to obtain the high-quality finished paint job required on the enclosures.

General Electric contacted an ACP representative for consultation. He surveyed the operation and at his recommendation ACP Dip GRANODINE 20 was adopted to replace the process in use. The result has been finishes of a clean smooth appearance, besides improved corrosion resistant qualities. In addition, rejects have been materially reduced.

Perhaps you have a similar problem in your finishing department . . . or others that can be solved by using an ACP chemical prepaint treatment. Our application engineers will be glad to help you—feel free to call on us. American Chemical Paint Co., Ambler, Pa.

*Reg. TM of General Electric Co.

GRANODINE is a registered trademark of Amchem Products, Inc.



**CHEMICAL TREATMENT PROCESSES** like ACP Dip GRANODINE 20 used in this Magnus Aja-Lift Automatic Dip Equipment offer improved corrosion resistance, excellent paint adhesion, durable paint finishes.

# Amchem Products, Inc. Ambler 33, Pa.

Formerly AMERICAN CHEMICAL PAINT COMPANY

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of solid

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**Superior Steel**

DIVISION OF

CARNEGIE-ILLINOIS STEEL CORPORATION

CARNEGIE, PENNSYLVANIA

The stainless steel flatware illustrated is produced by ONEIDA, LTD., Oneida, New York

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- **porcelain enamel!**
- **Pemco frits and colors!**

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Kitchen cabinets | Home freezers | Commercial refrigerators | Air conditioners | Business machines

# Check THESE ADVANTAGES OF Chef-O-Matic

**ALL-ELECTRIC SURFACE ELEMENT TEMPERATURE CONTROL**

## FOR THE USER

Provides dependable automatic control of cooking temperatures. Any selected increment of temperature from 100° F to 485° F is reached quickly and then uniformly maintained. In boiling, for instance, pan temperature is accurately controlled at any desired point from a slow simmer to a vigorous boil.

These control elements are not fragile — not damaged or thrown out of adjustment in normal service.

There is no danger of electric shock because only low voltage is used in the control circuit. (12 V)

## FOR THE RANGE MANUFACTURER

Chef-O-Matic is low in cost. It is easy to install because the two small, compact control elements are ALL-ELECTRIC. They readily fit any electric range. Spade terminals simplify connections.

A single temperature adjusting screw compensates for changes in altitude and for differences in range design.

Fluctuations in line voltage are automatically compensated—likewise ambient temperature up to 220° F.

Control elements safely carry any load up to 3500 W at 15 amp.

Only one transformer is needed regardless of the number of surface elements being controlled.

**For complete data, specifications and installation drawings write for Bulletin 576.**

**KING-SEELEY CORPORATION**
**ANN ARBOR, MICHIGAN**

KS

8133

# HOW ZINC-COATED STEEL SHEETS KEEP PRODUCTS–AND MANUFACTURERS–LOOKING YOUNG

Today, it's almost axiomatic that the more zinc-coated steel you put to work for you, the more freedom your products will have from corrosion—and the more freedom you'll have from customer kicks about corrosion and corrosion-caused maintenance costs.

That's why it pays to use zinc-coated steel sheets in the products you manufacture (such as light troffers, metal ceiling tiles, baseboard heating panels, sliding door hardware, etc.).

Look at the formability, for example. With either electrolytically zinc-coated steel sheets, or continuous process zinc-coated sheets, the tight coating stays tight through the severest fabrication operations. How about corrosion prevention? It's long-lived, uniform, relentless. First cost is low. Maintenance costs are nil. And the results are a lasting credit to your product and your reputation. How about paintability? Electrolytic zinc-coated steel surfaces, chemically treated, are unexcelled for painted products. It lets paint dig in and hold its unbroken smoothness and beauty for keeps.

In electrolytically zinc-coated steel, the name that stands for bonus performance is Weirzin. In continuous process zinc-coated sheets, it's Weirkote. Let us show you how Weirzin or Weirkote will keep your products—and you—looking young.

*Write for informative brochure on each today. Weirton Steel Company, Dept.* R-24, *Weirton, West Virginia.*

WEIRTON STEEL COMPANY

**WEIRTON STEEL COMPANY**

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a division of

**NATIONAL STEEL CORPORATION**

*Washer at work in a kitchen sink.*

# Development of the AMI portable washer

## details of product resulting from four years research and development

DESIGNERS OF THE PORTABLE washing machine produced by A M I Incorporated, Grand Rapids, Michigan, were faced with the problem of meeting four requirements:

1. Absolute safety, even when the unit is completely submerged in water, 2. High washing efficiency, 3. Light weight, and 4. Small size.

At the same time, the machine had to be made of materials impervious to damage by water or alkaline laundry preparations.

The A M I washer is the result of four year's research and development by company engineers. A compact electrical appliance of new design, it employs a combination of four washing actions to launder clothes efficiently and quickly. The four actions are agitation, aeration, tumbling, and an action similar to hand-washing.

The washer operates in water approximately seven inches deep, in a sink, laundry tub, pail or similar container. It launders up to four pounds of clothes in a container approximately eighteen inches in diameter. It mounts on three suction cups which hold the washer firmly to the bottom of the container.

The unit is powered by a fractional horse-power (1/20) shaded pole motor made especially for this purpose.

### Safety details

All windings, wires and connections are completely sealed in a waterproof epoxy resin compound for electrical safety. The motor is sealed in a corrosion resistant cast aluminum case and further protected by a plastic housing.

With all mechanical seals removed, the motor shows no measurable electrical leakage when plugged into an outlet and completely immersed in water, according to the manufacturer.

This test and many others for electrical safety were performed by A M I Incorporated and Underwriters Laboratories prior to washer receiving the UL seal.

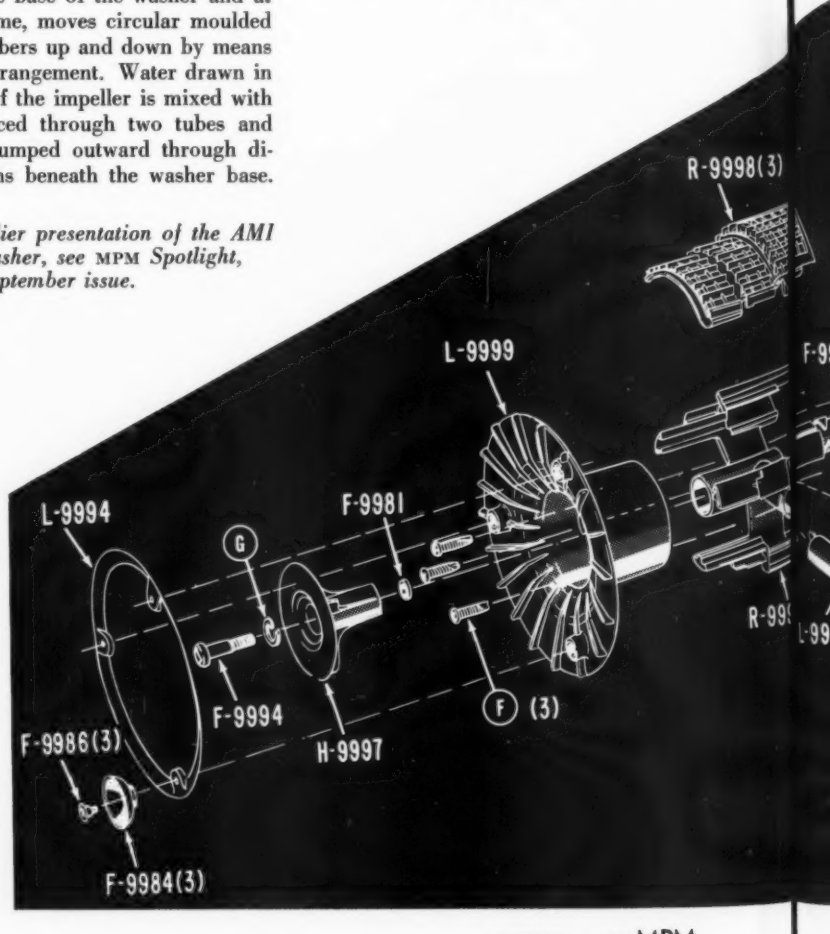
### Four-way operation

The motor rotates an impeller or pump in the base of the washer and at the same time, moves circular moulded nylon scrubbers up and down by means of a cam arrangement. Water drawn in at the top of the impeller is mixed with air introduced through two tubes and forceably pumped outward through directional fins beneath the washer base.

*For an earlier presentation of the AMI portable washer, see* MPM *Spotlight, page 14, September issue.*

The air-water mix thus formed is highly aerated, giving the solution an active, bubbly appearance.

The water and air currents set up by the pump move from the base of the washer out toward the side of the container and back toward the scrubbers at water surface level. Clothes are borne along this circular path down past the rapidly moving scrubbers whose action



on the fabric is similar to that of hand washing. Throughout the washing cycle fabrics receive the effect of agitation, aeration of bubbling currents of air, scrubbing, and constant underwater tumbling.

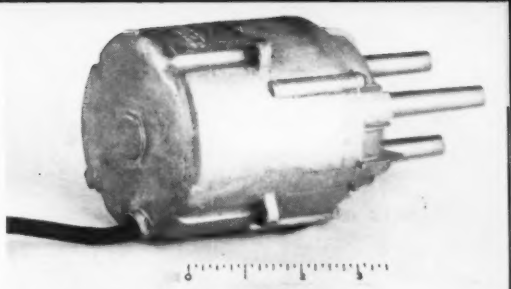
The new washer is 14¼ inches high 6¾ inches across the base, and weighs exactly nine pounds, ten ounces. It is furnished with eight feet of heavy duty cord, operates on 60 cycles, 115 volts, alternating (a washer to meet the 50 cycles, 230 volts current commonly found abroad will soon be introduced to the export market), draws 2.5 amps and 175 watts.

Motor and impeller speed is 1550 revolutions per minute at full load, with a 1⅜ inch, up-and-down scrubbing stroke moving at the rate of 390 strokes per minute, found by company engineers to be the ideal ratio.

Ball bearings on the washer are sealed and lubricated for life with high temperature grease. Washer case, handle, base and impeller, are of high impact phenolic; cam, agitator hub and scrubber sections are of nylon.

All metal parts are plated or made of corrosion resistant materials. The washer is covered by a comprehensive one year guarantee, with the nylon scrubber section additionally guaranteed for a five year period as specified in the factory warranty.

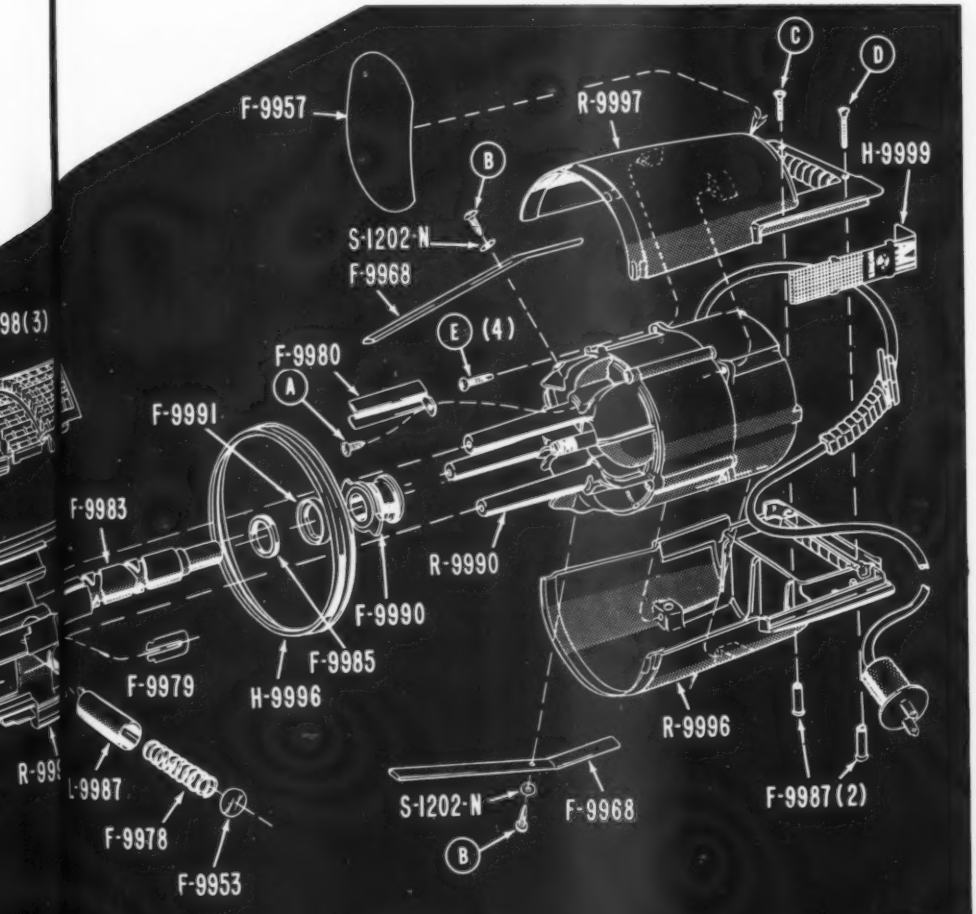
The efficiency of the A M I washer was evaluated by standards of washability set up by the American Home Laundry Manufacturers' Association. Reflectometer readings of fabrics washed by the unit are reported to compare favorably with those laundered in full sized conventional and automatic machines.



*Shaded pole, 1/20 hp, single phase motor, as used in the portable washing machine.*

PARTS NOMENCLATURE

F-9953 Spring Stop
F-9957 Washing Instructions Decal
F-9968 Tube
F-9978 Compression Spring
F-9979 Cam Follower Retainer
F-9980 Agitator Guide
F-9981 Gasket
F-9983 Cam
F-9984 Vacuum Cup
F-9985 Seal Face Gasket
F-9986 Vacuum Cup Screw
F-9987 Sleeve Nut
F-9990 Seal
F-9991 Seal Mating Face
F-9994 Screw
H-9996 Cover Trim Ring
H-9997 Impeller
H-9999 Name Plate
L-9987 Cam Follower
L-9994 Base Plate
L-9999 Base
R-9990 Comp. Motor & Line Cord Assy.
R-9996 Cover & Handle (Right Hand)
R-9997 Cover & Handle (Left Hand)
R-9998 Agitator Section
R-9999 Agitator Hub
S-1202-N Washer
A No. 6-32 x 5/16 Round Head Self Tapping Screw, Type 23 (Stainless)
B No. 6-32 x 7/16 Round Head Self Tapping Screw, Type 23 (Stainless)
C No. 6-32 x 5/16 Oval Head Machine Screw, (Brass-Nickel Plate)
D No. 6-32 x ¾ Oval Head Machine Screw, (Brass-Nickel Plate)
E No. 8-18 x 5/8 Round Head Self Tapping Screw, Type 25 (Stainless)
F No. 10-24 x 5/8 Round Head Self Tapping Screw, Type 23 (Stainless)
G ¼ Split Lockwasher (S.A.E. Med. Stainless)




*The personal washer stands 14 inches high, and weighs nine pounds. It is ready to go to work wherever electricity is handy.*

# Our paint finishing system builds sales

*by Alexander Wilson,*
TREASURER, ANDREW WILSON COMPANY

MPM FEATURE

Our new paint finishing system has brought us not only the expected benefits of increased production and lower costs — it has added a welcome bonus, as well, in the form of improved quality of product. It is only through consistently-superior quality, we feel, that a manufacturer establishes and maintains a volume of repeat orders, while adding new customers.

Superior quality achieved at excessive cost, however, forces a selling price at which even the best cannot be sold. Therefore, while our first consideration in the building of our new plant was to meet our increasing sales volume with greater productive capacity, it was necessary to do so with more efficient methods. And we, like many manufacturers today, were faced with quality maintenance in the face of rising production costs.

*Painted parts travelin to*

### Complete change in procedure

This called for automation. In fact, it called for the complete replacement of our existing procedure of vapor degreasing, hand wiping, and manual paint dipping. In the initial stages of planning our new building, greater capacity and lower costs were foremost in our thinking.

The finishing system as proposed consisted of a 2-stage phosphatizer, tandem flow coater, flow-out tunnel, and convection-type paint curing oven. It exceeded our expectations by more than quadrupling our existing productive capacity. It allowed us, moreover, to re-use 13 of our men elsewhere who had formerly been used in the finishing cycle operation.

Economies were achieved with the 2-stage washer-phosphatizer, when we found that a single solution could clean the parts by removing all oil and shop dirt and, at the same time, convert the surface of the steel to an inert iron phosphate. We have found a proprietary 2-in-1 solution that is 100 per cent effective both in cleaning and in providing the phosphate coating so necessary to good paint bond.

### Two-stage washer-phosphatizer

The 2-stage phosphatizer performs the cycle of phosphate-wash, chromic acid rinse, and dry. We made provision for the addition of an extra rinse to the existing machine, but it has not proved necessary, and it appears doubtful that we will ever need it.

All parts are carried on an overhead monorail conveyor at the rate of 5 fpm into the phosphatizing machine. The phosphate-wash section thoroughly cleans and phosphate-coats all parts of the work with a 1½-minute exposure held constant at 140° F, sprayed from all sides through 144 stainless steel spray nozzles at 50 ft. head pressure.

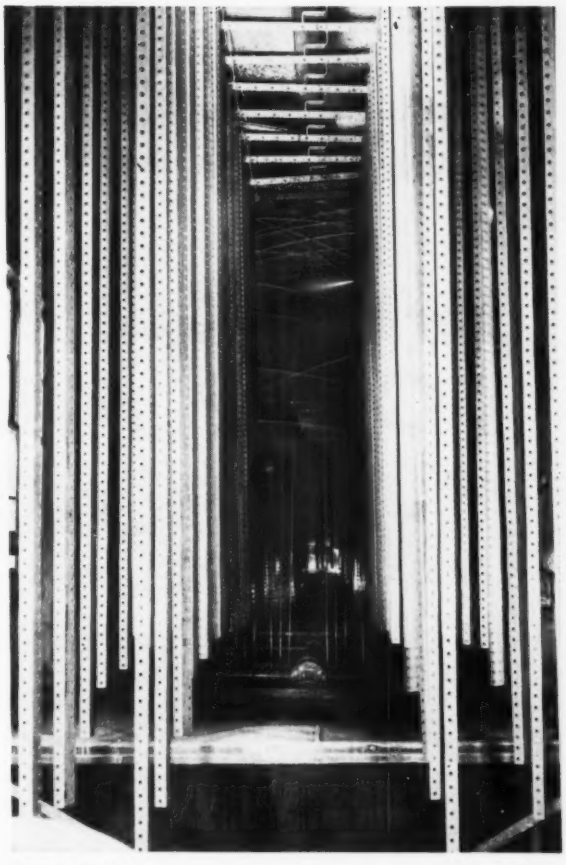
The phosphate-wash section is supplied by a 1,200-gal., direct gas-fired tank; the hot detergent-phosphating solution is pumped through the spray system by a 7½ hp vertical immersion-type motor pump at the rate of 400 gpm. The solution is completely re-circulated, requiring only 5 lb. of replenishment in an 8-hour day.

### Double filter system

We feel that a part of the secret behind the maintenance-free operation of our washer-phosphatizer is the double filter system in both the phosphate-wash and rinse sections which filters the solution as it re-enters the tank, and again at the pump intake inside the tank. The screen mesh openings in this second filter are smaller than the orifices in the spray nozzles; therefore, anything which passes through the pump filter also will pass with ease through the nozzles, providing constant spray pressure, and totally eliminating down-time due to clogged nozzles.

The chromic acid rinse, required by most Army-Navy specifications for painted products, removes all unreacted phosphate chemicals and sludge from the coating, and further conditions the phosphated surface for painting by

*traveling to paint curing oven.*



*Long shelving posts entering Green end of flow coater. (Inset photo) — Composite view of Wilson products, showing shelving, lockers, and component parts.*

PHOTOS COURTESY METALWASH MACHINERY CORP.

sealing the coating and increasing its corrosion resistance.

The 3-foot rinse section is supplied by an 800-gal. direct gas-fired tank, providing 300 gal. per minute of 170° F chromic acid rinse solution to 72 stainless steel spray nozzles. Pressures are supplied by a 5 hp vertical immersion type motorpump with a capacity of 300 gpm at 50 ft. head.

Overspray is prevented by means of a 10 ft. baffled vestibule between the phosphate-wash and the rinse sections, and between the rinse and the dry sections.

The dryer, a gas-fired hot blast dryer, is 19 ft. long, and contains 15 specially-designed hot blast nozzles which direct 250° F air, at 8″ static pressure, into all areas of the work.

The steel sections which are later to be assembled into lockers, shelving, and bins, are conveyed directly from the dryer into the flow coater.

### Two-color tandem flow coater

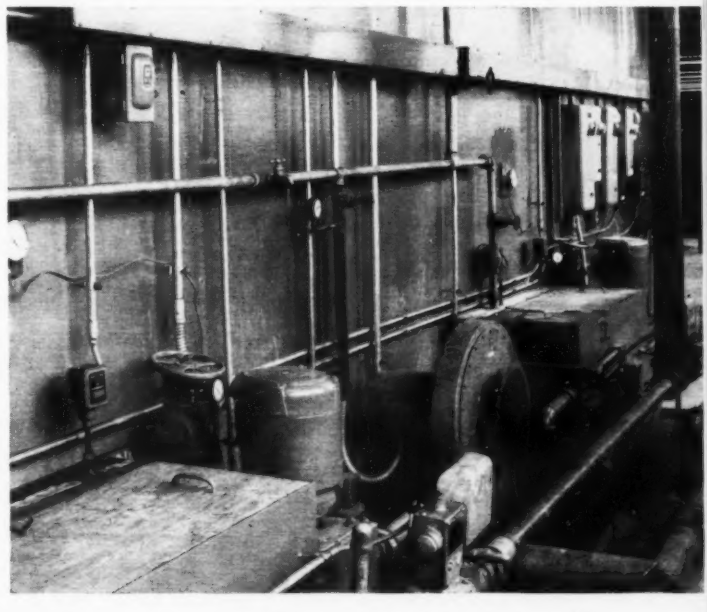
The flow coater, which to my knowledge was the first 2-color tandem unit ever installed, is the ideal answer to our production methods because 90 per cent of our entire output is finished in either Wilson Green or Wilson Gray enamel.

The tandem arrangement permits us to maintain full storage tanks of both colors, making it possible to switch over from one color to the other in the shortest possible time.

Each 3 ft. section of the tandem flow coater is completely provided with its own self-contained system of 3 sets headers and 75 specially-designed flow coat nozzles. Each section

*to Page 56* →

*Close-up of washer-phosphater showing side tank extensions, pumps, and blower for providing primary combustion air to burners.*



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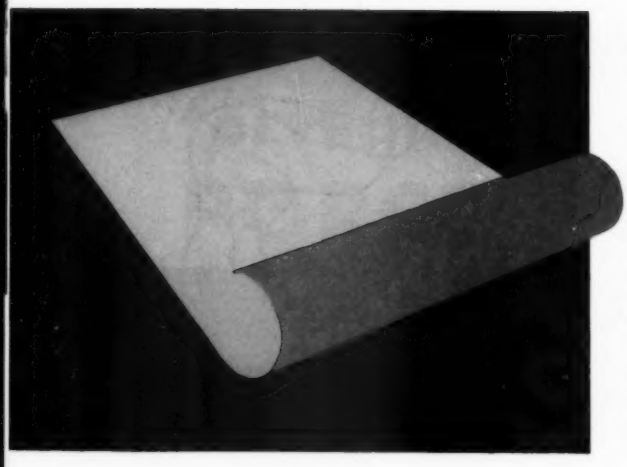
# Now . . . to all the advantages of aluminum

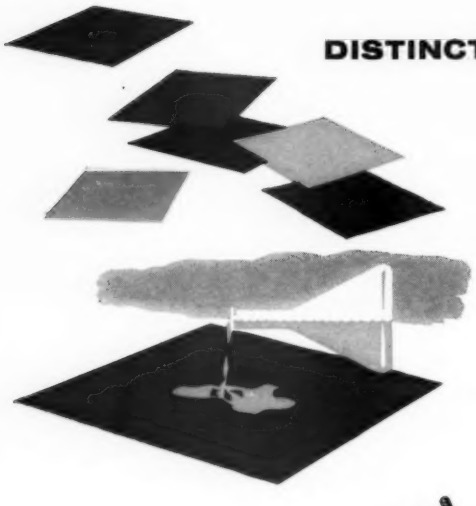


## add lifetime COLOR!

The "wedding" of two *lifetime* materials—Aluminum and Porcelain enamel—can well revolutionize a host of businesses, bring major changes to a number of industries.

Wherever *appearance* is important, users of aluminum will want to take a good hard look at this new development. And users of other metals, too, will do well to investigate the potentials in this new combination of materials. To the lightweight and anticorrosive qualities of aluminum can now be added the sales stimulating power of *color*. Color as permanent as the metal to which it is fused.

A broad range of colors is yours to choose from in this new porcelain enameling process. Flat sheets, extrusions, formed shapes and castings can be thus treated. Even *welded* assemblies can be porcelain enameled.





### DISTINCTIVE PROPERTIES OF PORCELAIN ENAMEL

#### *Surface Texture and Color*

Almost any degree of surface reflectivity is possible, from dull matte to extremely high gloss. Surface variations are innumerable. You can choose from a wide range of light-fast colors; and the durable "glass-like" finish minimizes maintenance problems.

#### *Chemical Resistance*

Exposure to strong detergents causes no staining, streaking or loss of color. Resistance to acids, alkalies and sulfides is excellent, comparable to other porcelain enamels. Coatings are relatively unaffected by salt water.

#### *Thermal Shock*

Panels heated to 1,000° F, then plunged into cold water, show no cracking or flaking of the porcelain enamel surface.

*Lifetime color* can add sales appeal to hundreds of products, and the combination of lifetime color and *aluminum* is a combination hard to beat. But you still must produce it . . . and that's where Ferro can help you. When, and how, can we help *you*?

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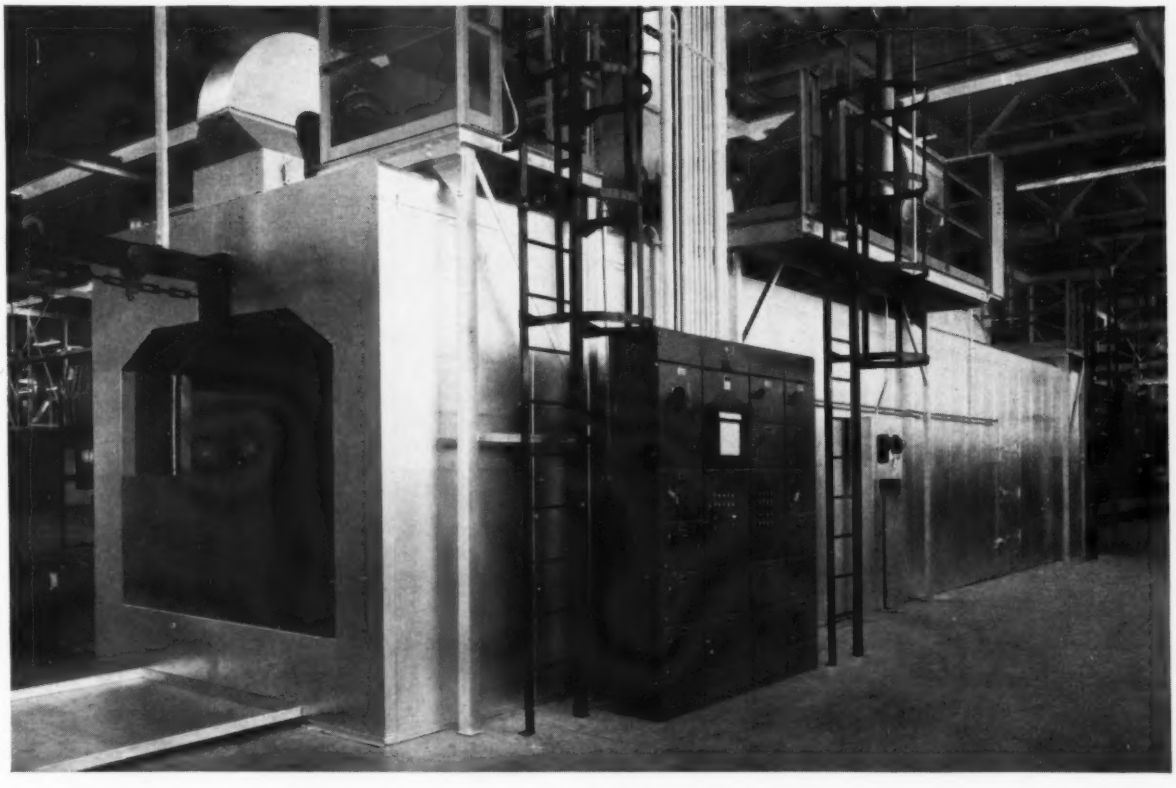
# FINISHING SYSTEMS...



## MODERN PRODUCTION FINISHING METHODS Require ULTRAMODERN FINISHING EQUIPMENT!

The function of the modern Dry-Off Oven, pictured above, is to thoroughly dry metal parts after passing through the Cleaning and Rust Proofing Machine in a Complete Mahon Finishing System installed in an Automobile parts plant.

When you have a finishing problem, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the initial planning and engineering which is so vital to a properly coordinated production finishing system.

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**Inconel burning hooks** bent from 3/32 in. dia. rod, support ware at U.S. Porcelain Enamel Co., Los Angeles, California. Plant makes enameled plumbing ware, stove parts, signs.

# "Hook up" to Inconel... for pileup protection, for ware safety

These 10-inch Inconel* nickel-chromium alloy burning hooks are proving their advantages again in the picture above, for one of the West Coast's outstanding manufacturers of high quality enameled products — the U. S. Porcelain Enamel Co.

This company's ware is carried into 1550°F furnaces on Inconel hooks. They're strong at burning temperatures; don't break or stretch under load . . . eliminate furnace pileups. And they form a tightly-adhering protective film — no flaking-off to spoil ware.

**Inconel alloy is readily formed, welded** into useful burning tools. Items like these hooks are often made in the enameling shop itself.

Inconel alloy offers other answers to your need for long-lived burning tools — Inconel drop rods, shoe plates, and other "hot spot" equipment may well help lower your maintenance costs.

For information on prices, deliveries, get in touch with your nearest Inco Nickel Alloy distributor. He'll be found under "Nickel" listings in phone directories of all major cities.

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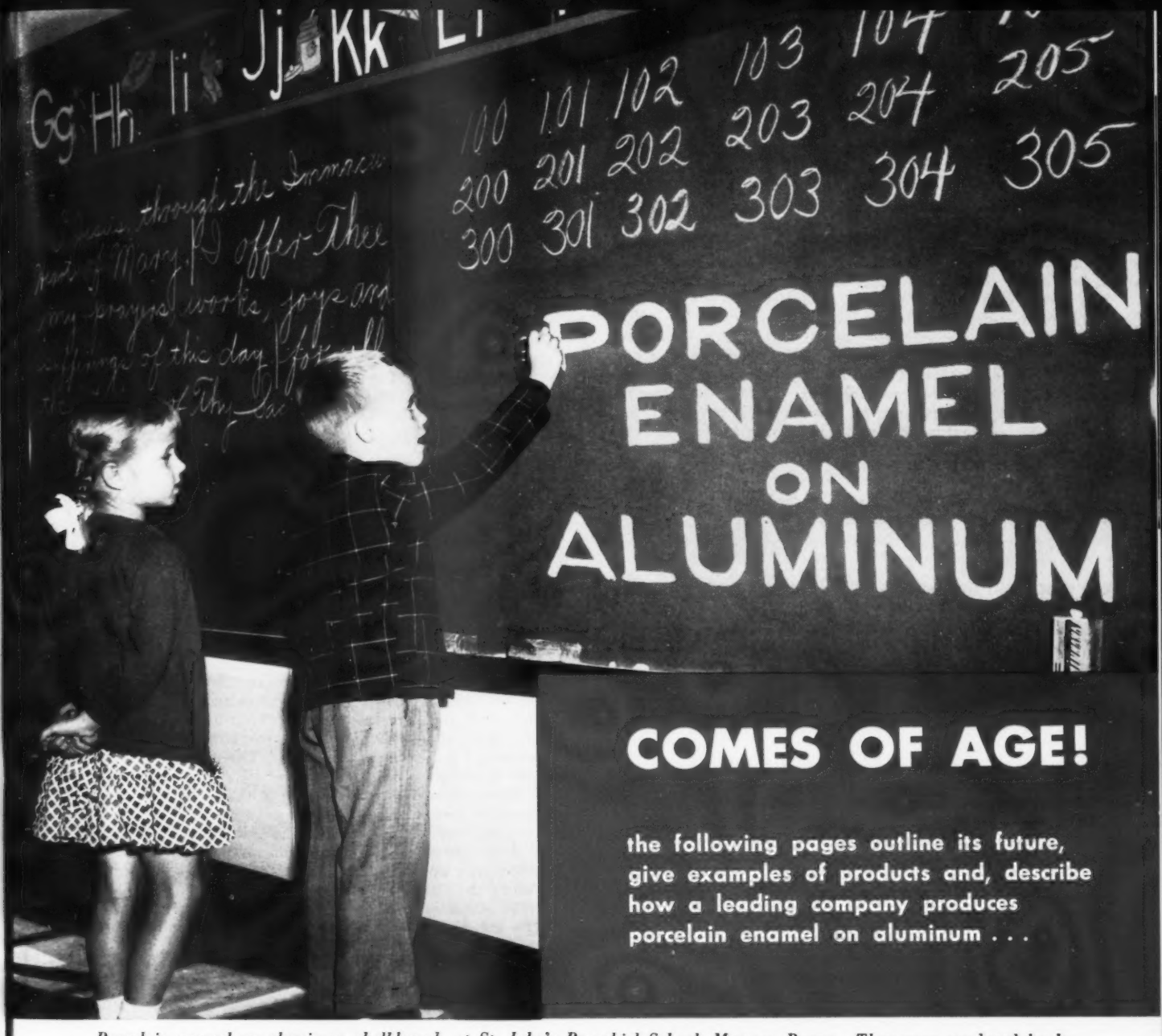
# INCO NICKEL ALLOYS




*Porcelain enamel on aluminum chalkboards at St. John's Parochial School, Monaca, Penna. They were produced by Ingram-Richardson Mfg. Co., Beaver Falls, Penna.*

MPM EXCLUSIVE FEATURE

As early as 1945, our editors started to follow developments in a material that was then in the technical development stage — porcelain enamel for aluminum.

Our first comprehensive technical articles on the subject of "vitreous" or porcelain enamels for aluminum were published starting in January, 1949, with photographic illustrations of some of the first architectural installations of the material.

Since this early work, it has been the policy of our editorial department to present periodic reports of progress, both in the form of technical discussions, and examples of practical applications.

Only three or four years ago, the number of plants specializing in the application of porcelain enamel to aluminum and/or aluminized steel could be easily counted on the fingers of one hand. As this feature goes to press, twenty-seven plants are in operation, and many more are in various stages from the planning board to installation.

The executive statements to MPM by leaders among the metal and frit producers and the operating plants, offer first-hand opinions concerning the products, the markets, and the future of a comparatively-new development. Typical examples of the material in use serve to illustrate its immediate markets.

Additional plant articles covering the application of porcelain enamel and aluminized steel have already been scheduled for later issues.

The following presentation is offered, not as an introduction of something startingly new, but as a progress report on a development that is considered to be definitely promising for immediate applications, and for the long-range future — that's why we titled it "Porcelain Enamel on Aluminum Comes of Age."

Editors

BY *W. Bradley Blair* VICE PRESIDENT — SALES, FAIRMONT ALUMINUM CO.

### A vital place in the growing demand

As independent producers of aluminum sheet products, supplying largely the appliance and consumer durable goods industries, the Fairmont Aluminum Co. has studied, with keen interest, the development and requirement for porcelain enameled aluminum sheet. We have recognized the apparent demand for this product.

Presently, we are installing equipment and readying a quality of material that will be suitable for porcelain enameling. It is our considered opinion that this is one of the most undeveloped markets for our production. Recent technical developments, and the Porcelain Enamel Institute, indicate to us that aluminum has a vital place in the growing demand for porcelain enameled products.

BY *F. C. Stevens* SECRETARY-TREASURER HAMLIN-STEVENS, INC.

### Let's not kill the goose that laid the golden egg

Fortunately for me, I have been in the commercial porcelain enameling of aluminum exclusively for more than twelve years and have seen the astounding growth and acceptance of this newest member of the ceramic finish family.

This acceptance of porcelain enameled aluminum is in a large part due to the fact that architects and other potential users have been convinced, by the work already done, that in this finish alone can they be sure of only the highest quality work.

It behooves every one in the industry, not only the newcomers, but the veterans as well, to never make any compromise with quality in the work he does, lest we find this great new potential market blighted.

Porcelain enameled aluminum is a quality product; let's all keep it just this and our market is almost limitless.

BY *Ernest M. Hommel* PRESIDENT THE O. HOMMEL CO.

### Entirely new markets for porcelain enamel

In recent years significant progress has been made in the use of porcelain enamel on aluminum. This progress has opened up entirely new markets for porcelain enamel; and although we are inclined to be somewhat more conservative than those who predict a glowing future for this new field, we do feel there is a very attractive market in prospect. Not to be overlooked is the use of porcelain enamel on aluminized steel. We have noticed a strong trend in this direction and believe this market, as well, bears close attention.

A retarding feature in the past was the feeling that an aluminum finish did not need a ceramic coating. Perhaps there are many who still hold to this view. In our opinion, however, the battle has been won. Versatility and lifetime permanence of color, increased strength and rigidity, and scratch hardness are just some of the features which have won a definite place for porcelain-enameled aluminum and aluminized steel.

In keeping with the trend to these new uses of porcelain enamel, we plan continued research and development of frits and colors to serve the market.



MPM EXCLUSIVE FEATURE

# Future of Porcelain E

HOMMEL

PENTON

BRADLEY

BY *R. F. Hafer* DIRECTOR PROCESS DEVELOPMENT SECTION, REYNOLDS METALS CO.

### Many favorable signs, but much to be done

The number of producers of porcelain enameled aluminum has almost doubled since 1957.

Much of the equipment recently put into operation, or now being installed, has been designed to meet the needs of specialized markets or products rather than being conversions from other porcelain enameling practices or being designed for extreme flexibility. Three major requirements for significant cost reductions are, therefore, being met.

Competition is rapidly being established. Increased production should reduce the cost of raw materials, and specialization should result in better production efficiency.

I feel porcelain enameled aluminum has come of age and the major portion of the technical, educational, and promotional problems, required to make a good, new product or material a success, have been, or are rapidly being, solved. To me, the future of porcelain enameled aluminum is as bright and as colorful as the product itself.

BY *J. B. Wallace* PRESIDENT WALLACE NEON LIMITED

### The trend is toward bright, clear colors

I feel that the future of porcelain on aluminum and aluminized steel will be very colorful.

My reasons for stressing color — the trend today is toward bright, clear colors of lasting quality and flexible enough to have a luster from eggshell to mirror bright.

The very fact that aluminum can be covered with a porcelain finish opens up a whole new field for enameling. In my opinion, the building industry will become the greatest users of the finish. I do not feel the basic cost of aluminum compared to steel to be a deterring factor.

Porcelain on aluminum or aluminized steel can be drilled, cut, or punched after enameling without the danger of chipping, as was the case before in high temperature enamels. The extreme flatness of aluminized steel after firing is a dream of the enamelers come true.

One problem facing the industry is in the right type of furnace for the job. This, of course, will improve when more enamelers are using low temperature frit. The versatility of low temperature enamels has already surpassed the high temperature field, and every day new uses are discovered.

# Enameled Aluminum {and aluminized steel}


BLAIR


TURK


LAWSON

BY *Burton C. Bricker* TECH. ASST. TO PRODUCT MGR.
ELECTROCHEMICALS DEPT., E. I. DU PONT DE NEMOURS & CO.

## The full gauntlet of creative expression

The development of low melting porcelain enamels has opened an entirely new horizon to the ceramic industry. After more than fifteen years in research, development, and commercial evaluation, porcelain enameled aluminum is finding acceptance in a wide variety of applications, particularly in the architectural, transportation, and sign fields. Low melting glasses suitable for appliances are a reality, and research in the dielectric field can still further broaden the potential market. Steadily increasing demand assures the future.

Aluminum, with its light weight, ease of fabrication, and inherent resistance to corrosion, has proved an excellent base for the hard, durable surface of porcelain. The comparative low cost and high strength of aluminized steel has combined with porcelain to provide an alternate structural medium.

The architect, the stylist, the designer, and the engineer can now range the full gauntlet of creative expression, dictating color, shape, and dimension.

BY *Herbert Turk* PRESIDENT
PEMCO CORP.

## Increasingly important role in future growth

Porcelain enamel on aluminum is certainly a new and exciting application to be considered in the future marketing and product development plans of the Porcelain Enamel Industry. The specific advantages of aluminum—light weight and ease of handling and non-rusting — are increased and enhanced by the smooth, hard porcelain enamel coating that adds rigidity to the metal and provides the exclusive quality of permanent, non-fading color.

Already many new applications, such as curtain wall panels, small appliances, utensils, and highway signs, are being produced of porcelain enamel on aluminum. According to estimates of leading authorities in the aluminum industry, production of porcelain enamel on aluminum in 1957 was at the rate of 5.2 million square feet, a 50-per cent gain over 1956 production. And these same authorities expect that in 1961 the consumption of porcelain enamel on aluminum will have increased to 23 million square feet. Even with a more conservative evaluation, however, it can easily be said that porcelain enamel on aluminum will pay an increasingly important role in the future growth of our industry.

BY *Alan Bradley* PRESIDENT
BRADLEY NEON-PORCELAIN CORP.

## Reluctance to change

The reluctance-to-change factor in human nature has been one of the most important elements which has kept porcelain enameled aluminum from coming of age before now. In our case, dependence upon old products, and the fear of new ones by architects and builders, have given us the time we needed to adequately develop this new product.

If this "Coming of Age" had happened one or two years ago, we would all have suffered a severe set-back due to our inability to deliver in quantity a controlled-quality product. Even today, most porcelain enamelers of aluminum find themselves alternately in a "feast or famine" sales condition. While this condition is not new to any industry, I doubt if many of the old-time porcelainizers can remember when the condition was as acute with them as it is with us now.

With the above mentioned problems being quickly overcome and with problems of production and quality control already behind us, we, on the West Coast, are in complete accord with the statement that porcelain enameled aluminum has truly come of age.

BY *H. V. Penton* VICE PRESIDENT
CALIFORNIA METAL ENAMELING CO.

## A steady increase in the program each year

Here at Cameo we have been doing a great deal of thinking about the future of porclain enameled aluminum. Our first work with aluminum began a number of years ago, and since then there has been a steady and consistent increase in the aluminum program each year. The same growth has been true of aluminized steel, which has found new and interesting uses with future promise.

The technological advances in the ceramic field will play a big part in the future of porcelain enameled aluminum. Much work still needs to be done in developing lower cost enamels that will have good coverage in one coat and that can be applied by low cost methods.

The new fields being constantly opened up by porcelain enameled aluminum should provide the enameler a good opportunity to increase his business and improve his products. The competition with other materials is going to be more difficult all the time as they more closely approach the high standards of porcelain enamel. Porcelain enameled aluminum could play a big part in keeping the industry active and growing, even in the face of these new competitive products.

BY *Russell A. Lawson* VICE PRESIDENT-MARKETING
MONARCH ALUMINUM MFG. CO.

## A vital role in consumer product sales

The use of porcelain enamel on aluminum should play a vital role in the increase in consumer product sales forecast for the next five years. The latent potential of this process is just reaching full recognition.

Sound merchandising of porcelainized aluminum products can increase sales through two major factors. New products can offer functional features designed around the recognized dependability of porcelain enamel. New sales can be built on the proven sales appeal of color on consumer products, speeding the obsolescence of products produced when a satis-

RICKER

NOBLE

JENSEN

HAFER

LORING

DAVIS

factory method of applying color was not available.

Production capacity for a wide range of applications of porcelain enamel to aluminum is sure to be developed in pace with ultimate production demands. Within the last two years, high production volume has been achieved on castings produced by the permanent mold process. This alone offers a wider latitude in product designing, and further break-through on other forms of fabrication will follow.

Marketing and manufacturing executives, mindful of customer buying preferences, have a powerful new sales potential at their disposal. Colorful surface finish, lasting surface protection, and unusual thermal properties offer new sales appeal. Application of these advantages in product designing will form the foundation on which this relatively-new industry will expand to meet the challenge of tomorrow's untapped markets.

BY *J. G. Breedlove* PRODUCT MANAGER
OF PORCELAIN ENAMEL FRIT FOR ALUMINUM, AMERICAN LAVA CORPORATION

## Aluminum and color—evidence of a change

Aluminum products have and merit universal acceptance in the home and industry. This acceptance has been accomplished in a relatively few years but is solidly rooted. During this period of rapid growth, aluminum has been a notable exception to the color trend. Although Americans were demanding more and better colors from most products, they seemed to be only mildly concerned about the lack of color in aluminum products. There is increasing evidence that this situation is changing.

Porcelain enamel gives color and hardness without detracting from the basic qualities of the metal. It offers tremendous potentials for a wide variety of manufacturers. Enamelers of other metals have an advantageous position because of their knowledge and skill in the enameling process. The metal producers have a large stake in the industry and would do well to consider the enameling of aluminum sheets, extrusions, and foil. Fabricators of aluminum products should seriously consider the sales advantage that porcelain enamel would contribute to their products.

Several estimates have been made on the growth of porcelain enameled aluminum. These estimates have indicated very substantial growth in all products, particularly for architectural porcelain enamel. This market is undoubtedly large and is growing rapidly. Other application areas of less potential volume seem to have equally great prospects for profit in the near future.

BY *Dr. R. W. Ricker* ASST, CHIEF, PROCESS METALLURGY DIV., RESEARCH LAB., ALUMINUM CO. OF AMERICA

## Special alloys in both sheet and extruded

The meteoric rise of aluminum in the construction industry, coupled with the myriad range of colors and advantages possible with porcelain enamel today, is making the combination a "natural" for practically any type architectural design. Since porcelain enamel on aluminum is thinner and has better adhesion than porcelain coatings on other metals, it can withstand much greater deformation without chipping. Color match is accurate and no noticeable fading occurs.

A range of surface finishes, from full gloss to semi-matte, can be produced. Should the porcelain be fractured by impact, the surrounding enamel will not chip back beyond the damaged spot, and there will be no colored corrosion product to stain the panel. These and many other advantages add to the economic feasibility of this product as a prime building material.

To create an even greater acceptance of porcelain enameld aluminum, Alcoa has recently perfected special alloys in both sheet and extruded shapes for the industry. Although sales of these new alloys have already accounted for many hundreds of thousands of pounds of aluminum, we still have our laboratories working full time on even more developments. With this continuing research, not only by Alcoa, but by everyone in the industry, porcelain enameled aluminum is becoming one of the major products in the construction field.

BY *David S. Miller* VICE PRESIDENT OF MARKETING KAWNEER CO.

## Ten years of progress in architectural products

Since Kawneer pioneered the first commercial product application of porcelain enamel on aluminum more than ten years ago, this type of finish has made slow but steady progress in architectural products. For example, this year we have introduced an entire new line of products that are integrated under a plan of harmonizing porcelain colors. Two of these products are entirely new application ideas stemming from the advantages of porcelain enamel on aluminum.

Because the unique features of this material coincide so closely with the requirements of modern architecture, there can be no doubt that we will see a steady increase in its use in building.

Secondly, while porcelain enamel has been maturing as a commercial product, architects and their clients have been increasing the demand for color in buildings. These parallel developments of product and market mean a bright future for porcelain enameled aluminum—beginning in 1958, not 1968. Kawneer is now basing a substantial part of its marketing program on this fact.

BY *Charles J. Jensen* PRESIDENT VIKON TILE CORP.

## Many new ideas and applications developing

From the very outset of Vikon's entrance into the porcelain-on-aluminum field, it has had considerable confidence in the future of the combination of vitreous enamel fired to aluminum. Naturally, this faith has been essential to the management of Vikon to offset the many trying situations which have accompanied the development of the combination as far as its use on metal wall tile is concerned.

Vikon had no illusions to the fact that porcelain-on-aluminum wall tile would set the world afire from the beginning and prepared itself to wait out the shakedown period. Now, after approximately two years of continuous

SAWYER

STEVENS

MILLER

WITHEY

BRICKER

WALLACE

production, the company is beginning to see a general acceptance of the product, and resolutely plans to continue its research work toward the development of a metal wall tile that will be acceptable for every potential use in the wall surfacing field.

Many new ideas and applications for porcelain-on-aluminum wall covering are being developed in addition to our standard wall tile line. Large panels of varying sizes from 8″ x 16″ to 12″ x 24″ are now in experimental production, and several buildings have received curtain wall covering with porcelain enameled aluminum extrusions.

We find that architects are increasingly specifying porcelain-on-aluminum tile for residential and commercial installations.

BY *David F. Sawyer* GENERAL MANAGER
MARVEON

## The sign face and custom panel market

The advent of two new products in the Porcelain Enamel field has created a new outlook on the production of porcelain enamel flatware, or principally sign faces and custom panels. These are the combinations of low temperature frit, processing below 1,000°, and aluminized steel. When aluminized steel is furnished dry from the mill, there is no need for cleaning prior to pre-firing in the furnace. This eliminates the need for much expensive equipment and preparation for processing.

The panels or flat surfaces are processed the desired number of coats or firings on one side only and yet they maintain their flatness without pillowing, and maintain their contours as they were before firing. When quality control tests are followed, the characteristics of abrasion resistance, acid resistance, and color retention are comparable with higher temperature products.

This material and method of processing now being used successfully by several enamelers promises to be a great boon to the sign face and custom structural panel market. This is due principally to the simplified process, which requires much less handlng and a much smaller investment than heretofore necessary to produce a similar product.

All of the other advantages of processing low temperature frits on aluminum which have made this field so useful and popular are, of course, retained.

BY *R. G. Davis* PRESIDENT
THE SPARTAN CORP.

## A birthday cake without the icing

The exciting new world of light metals will miss a great opportunity if it does not utilize fully the romance and glamor made possible by porcelain enameled aluminum. A birthday cake would be quite dull without the icing.

This holds true for the cautious investor casting his eye over plans for a colorful new shopping center, and it is still more true in the case of a far more important customer — that modern young housewife, mentally matching a turquoise pressure cooker with the color scheme of her ranch home kitchen.

The functional advantages speak for themselves. I do not intend to minimize them. But I do think the American public today, in contrast with twenty years ago, is one step ahead of the designers and engineers. Buyers are eager to accept and buy new innovations. Twenty-five years ago, the revolutionary DeSoto design was ahead of the public; today, the public is waiting expectantly to be shown and sold a dramatic model.

So long as porcelain enameled aluminum is properly used, functionally and tastefully, customers will be awaiting it faster than engineers, architects, and designers will be specifying it.

BY *W. H. Withey* SUPERVISOR
CONSTRUCTION MARKETS, ARMCO STEEL CORP.

## Take advantage of market opportunities

Since the DuPont development of the low fired frits for aluminum, a considerable amount of work has been done to apply these frits to Armco aluminized steel. This has been done by interested enamelers working on their own as well as by various frit companies and Armco.

In the course of these few years, the basic advantages and predicted characteristics of the material have been pretty well confirmed. However, some problems and bugs did arise. Laboratory techniques have been developed to solve these, and a number of enamelers have succeeded in converting this effort to commercial practice.

Thus today, we find at least one major company producing chalkboards in volume, six or more companies using aluminized steel regularly in signs and store fronts, and at least one enameler can point to several completed curtain wall installations.

These facts would seem to indicate that the time is rapidly approaching when any forward thinking enameler not already familiar with the material will want to become so, and with the enameling techniques involved, so that he may be prepared to take advantage of the market opportunities that appear in the offing.

BY *J. Fred Ingram* PRESIDENT
INGRAM-RICHARDSON MFG. CO.

## Prospects for an increasing market

Our company finds that a great many more inquiries now are being received on potential jobs involving porcelain enamel on aluminum. These inquiries from architects and general contractors are not only for spandrel panels but also for extruded mullion sections — an application which has been relatively rare in the past.

We feel that prospects for an increasingly good quantity market for porcelain enamel on aluminum are particularly promising.

That opinion is based on actual experience with architects which indicates they are beginning to recognize that the porcelain enamel finish provides a far higher order of permanence, uniformity and selection of different colors than is available with any other finish for aluminum.

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# Processing methods

## a review of the accepted procedures in porcelain enameling aluminum

DURING THE EARLY YEARS of porcelain enameling aluminum, processing methods changed often as improved procedures were discovered and then proven in use. In more recent years, processing methods have come to be standardized as a result of actual field evaluations and tested results.

A resumé of each method is given here of the processing methods of porcelain enameling on aluminum. Complete information is available from the frit suppliers and the Porcelain Enamel Institute, Bulletin AL-2A, "Recommended processing methods for porcelain enamel on aluminum alloys."

### Selection of aluminum

For sheet and extrusion use, types 1100 (2S), 3003 (3S), 6061 (61S); aluminized steel, commercially pure aluminum-silicon alloy used as laminating surface; for extrusion alloys, types 6062 (62S) and 6063 (63S); for castings, types 43, 356, and 344X.

Extruded shape should be free of die lines, since they will show up through the enameled coating. Extrusions should also be free of carbon pick-up and oxide pick-up. Outside corners require at least 1/16-inch radius, and inside corners 1/8-inch radius to prevent burns and build-up of the enamel coating.

### Welding

Oxidation should be observed carefully during welding of aluminum. The oxide film must be removed or prevented during the joining operation. It is usually removed by the use of fluxes to form a fluid slag. Flux can be removed by immersing the parts in boiling water, followed by immersion in a cold solution of 5 to 10 per cent nitric acid for 10 minutes.

The following welding processes are used for fabricating aluminum: fusion welding with a torch flame (oxy-hydrogen or oxy-acetylene are preferred to other combinations). Gas welding is normally confined to materials from 1/32 to 1/8 inches in thickness. For thinner materials, spot or seam welding is employed.

### Metal preparation

For aluminum alloys, 6061, 6062, 6063, and 3003, cleaning is accomplished by immersing for 15 minutes in a 6 per cent sulphuric acid solution and a 1/4 per cent of a wetting agent such as fatty alcohol sodium sulfate or 0.5 per cent of saturated hydrocarbon sodium sulfonate. The temperature of this solution should be at room level.

After a water rinse, the aluminum is immersed in an alkaline-dichromate having the following composition: potassium chromate — 17-21 per cent by weight, and sodium hydroxide — 3.5-4.1 per cent by weight. The following table shows the make-up of the chromate pretreating bath based on both pounds per gallon of solution and pounds per cubic foot of solution. Estimated chemical requirements may be based on solution weight of 10-lbs. per gallon or 76-lbs. per cubic foot.

| | Lbs./Gal. of Solution | Lbs./Cu. Ft. of Solution |
|---|---|---|
| Chromic Sulfate .... | 0.02 | 0.15 |
| Potassium Bichromate | 1.47 | 10.90 |
| Sodium Hydroxide .. | 0.79 | 5.85 |
| Water ..... | 7.92 | 58.90 |
| | (0.95 gal.) | (7.1 gal.) |

Time and temperature of immersion for cast alloys should be 7 minutes at 104° F., and for wrought alloys 4 minutes at 120°F. Variations of the metal preparation method outlined here are based on proprietary cleaning compounds and are designed to prepare all aluminum alloys after a vapor degreasing and mild alkaline cleaner treatment is performed.

To suit their own needs, Ingram-Richardson Mfg.. Co., Beaver Falls, Pa., employs the sequence of operations shown starting with paragraph two on page 46 of this issue.

A more recently developed process, which eliminates prefiring, but has not been evaluated extensively in the field, consists of a 2 to 4 minute immersion in acid chrome bath at 180°F., water rinse, 1/4 to 1/2 minute immersion in alkaline chrome bath at room temperature (some manufacturers feel that a rapid "dip-in, dip-out' immersion is best here), water rinse with hose, and then a drain dry.

For commercially pure aluminum alloys the following procedure is recommended: a 2 to 6 minute immersion in a non-etch cleaning bath, followed by a water rinse, draining dry.

### Preparation of enamel

Porcelain enamels for aluminum must be ground finer than is normal practice with porcelain enamels for steel. The enamel charge, itself, should occupy a volume equal to 1/4 of the volume of the mill, according to the experience of manufacturers in this field. A rule-of-thumb to use to determine the ball charge in the mill is that there should be 2.6 pounds of balls or grinding media for every pound of enamel charge.

It has been recommended that about 1/3 to 1/2 of the entire charge should be made up of 1-inch to 1 1/4-inch balls, about 1/4 to 1/3 of the charge of balls 3/4 to 1-inch in size, and 1/4 to 1/3 of the charge should be made up of balls from 5/8 to 3/4-inch size. Balls under 5/8-inch size should be culled periodically.

All ingredients are charged simultaneously in the ball mill, with the exception of the water and, more recently, part of the mill additions. It has been found that more efficient grinding will result if only half of the water is charged in the mill initially. The balance of the water is then charged after the first one or two hours of grinding time have elapsed. The wet addition agent can be added at the end of the grinding period to reduce hydrolitic attack. Milling an additional 5 minutes after introducing wet mill agent should be adequate to mix the agent thoroughly into the slip. The dry mill agent can be added at the start as the hydrolitic attack is at a minimum.

Grinding should be done to a fineness of approximately 0.3 per cent retained on a 325-mesh screen.

In transferring the milled enamel to

the storage tank, it should be passed through a 60-mesh screen. Prior to actual use, the milled enamel should be passed through a 120-to 150-mesh vibrating screen or a gyratory screen and over a magnetic separator to remove any traces of magnetic iron contamination. Usually this is done just prior to actual use.

Porcelain enamels for aluminum are subject to hydrolitic attack which produces small aggregates and increases the tendency toward tearing. This difficulty appears in two to six weeks in cool weather, and may appear in less than a week in extremely-hot weather. A dull appearance in the fired enamel usually accompanies the first indications of excessive aging of the milled enamel. The usable life of a milled slip can be extended somewhat by omitting the addition agent and adding it just prior to spraying. The hot weather stability can be improved by cooling the mill with water spraying during the operation, and by storing the milled enamel slip under the coolest available conditions.

A standard procedure for checking the consistency of the milled enamel slip should be a part of the process control system in all plants. A specific gravity of 1.9 is considered the optimum for spraying the enameled slip; however, the exact value will have to be established for each operation, since it will be affected by the composition of the raw water used for milling, humidity conditions, spray techniques, etc.

Technical bulletin T-8, "Ball mill wet grinding of porcelain enamels," published by the Porcelain Enamel Institute, is an excellent reference on milling practices in the porcelain enameling industry.

### Application

For good spraying, the following points should be noted: (1) keep a close and accurate check on specific gravity and viscosity of the milled enamel slip; (2) check milled slip for fineness of grinding; (3) use widest possible fan spray; (4) screen enamel slip prior to spraying; (5) adjust air and fluid pressure correctly; (6) keep an accurate check on application weight when doing automatic spraying; (7) it is important that bisque surfaces not be re-sprayed as the tendency to tear upon firing is increased; (8) all applications should be made wet. A good practice is to keep the atomizing air to a minimum so that, upon spraying, the enamel will not run, and yet a wet application will result. The width of the fan must be adjusted to prevent dry spots. (9) Ware should be dried until surface moisture disappears. (10) Excessive buildup in corners and fillets must be avoided.

The thickness of application is recommended to 1 to 2 mils where resistance to thermal shock is of primary importance. Since resistance to abrasion is a function of enamel thickness, to some extent, heavier coatings, 4 to 5 mils, are recommended for certain applications, particularly in architectural uses where scratch resistance or surface hardness is important. Coatings of 3-mil thickness have good over-all properties, and are considered suitable for most uses.

### Furnace design and firing

Since porcelain enamels on aluminum are fired at temperatures of 900-1,000° F., close temperature control and uniform heat distribution are necessary, and it is important that an oxidizing atmosphere be maintained in the furnace.

These enamels may be fired satisfactorily by either convection or radiation in the following types of furnaces: electric, full-muffle furnace, any fuel; radiant tube furnace, any fuel (source may be either high intensity or medium intensity infra-red); and radiant burner furnace, gas-fired. Suitable furnaces may be either box type, intermittent, or continuous, depending entirely upon the volume and type of ware to be fired. It should be designed to heat the ware from room temperature to firing temperature in minimum time.

Most operators have found that it is best to insert the ware directly into the maximum temperature zone without a pre-heating cycle. This is necessary because prolonged drying or slow heating will induce tearing in the enameled surface. From 5 to 8 minutes at maximum temperature is recommended to equalize the temperature of the furnace load and to mature the enamel.

# Recommended test methods

## for evaluation and quality control of porcelain enamel on aluminum

UNDOUBTEDLY THE KEY FACTOR in the development of this relatively-new industry is the maintenance of quality of porcelain enamel on aluminum. An evaluation of changes in quality due to various types of material (porcelain enamel frit or base metal) and processing methods are also vital.

Methods that have been previously developed for testing various properties of porcelain enamels on steel are recommended for nine different evaluation areas. Bulletin AL-la, the tentative standard of the Porcelain Enamel Institute describes some of these tests and gives references for others. The following evaluation areas include brief descriptions of each test. These briefly-described tests include modifications that particularly adapt test procedures specifically to porcelain enamel on aluminum.

### Acid resistance

The Porcelain Enamel Institute bulletin T-7, "Test for acid resistance of porcelain enamels, part 1 — flatware," and ASTM standard C282-53, "Standard methods of tests for acid resistance of porcelain enamels," are briefed as follows: In the commercial test, which separates enamels according to classes, a small pool of ten per cent citric acid is placed on the specimen for fifteen minutes at 80° F. The degree of attack is then evaluated by visual methods by using such characteristics as visual stain, blurring of image, and ease of removal of a pencil mark. Class AA shows no visible effect on the treatment, and is the most resistant with class A, class B, and Class C and class D following in that order. Enamels falling in the latter two classes are not considered as acid resistant. This test is known as the spot test for acid resistance.

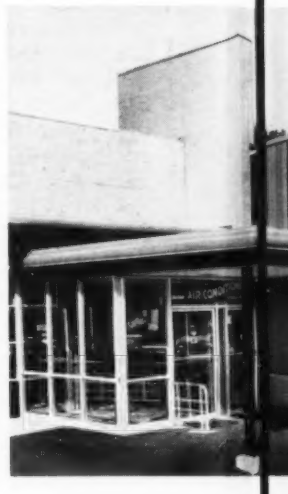
A quantitative research test specifies that the loss of a 45° specular gloss is measured for each specimen after a fifteen minute immersion in the ten per cent citric acid at 80° F. *to Page 43* →

# The products

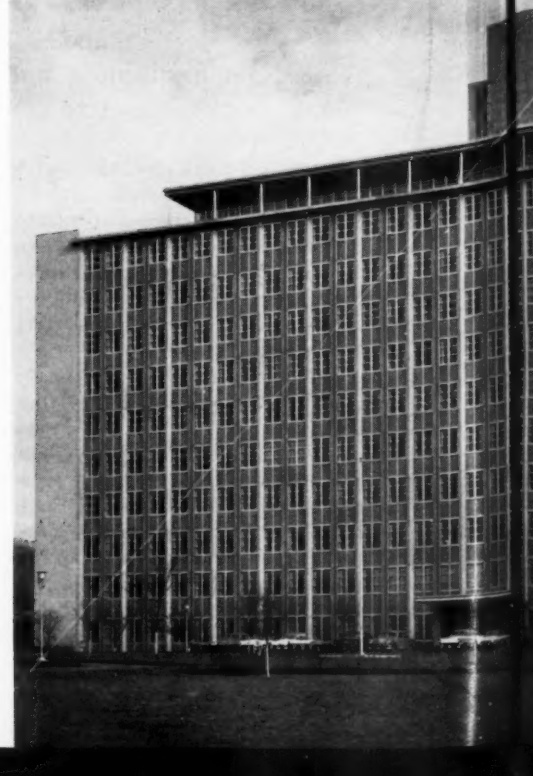
**these typical examples of practical applications help to demonstrate that porcelain enamel on aluminum has come of age**

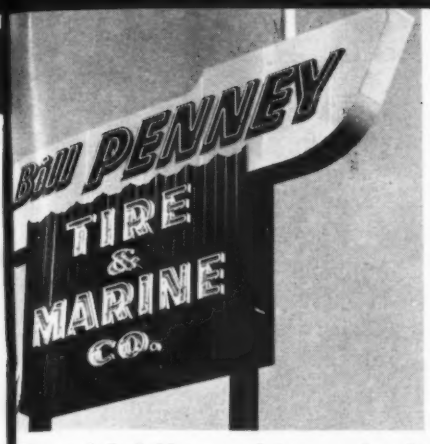

*The Aluminum Company of America Los Angeles sales office above was porcelain enameled by Stolle Corp. of Sidney, Ohio and California Metal Enameling Co. of Los Angeles. The architect was Claude Beelman & Associates of Los Angeles. New Kensington (Penna.) High School below has panels of light green porcelain enamel applied by Ingram-Richardson Mfg. Co. of Beaver Falls, Penna.*

*Champagne's Super Market in Manchester, N. H. designed by Koehler & Isaak, Manchester and porcelain enameled by Kawneer of Niles, Mich.*

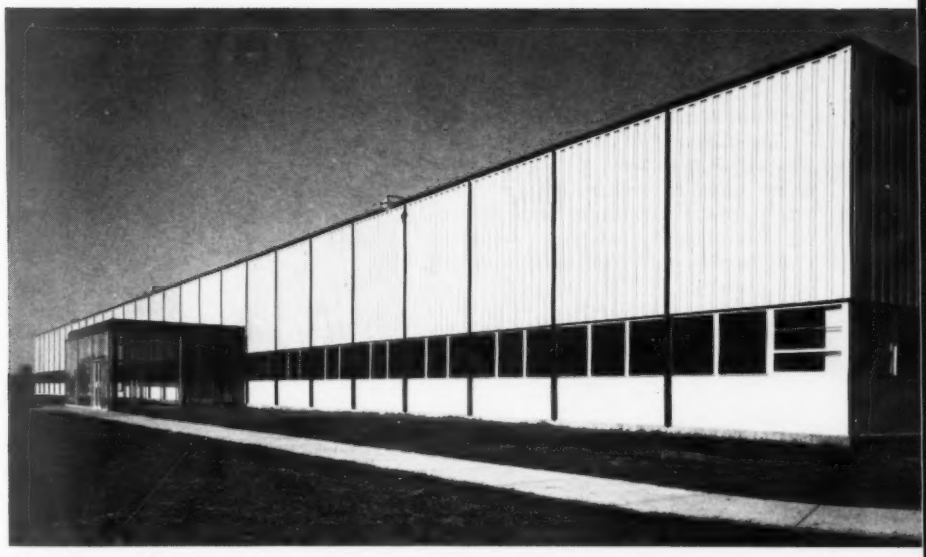


*Headquarters office, Charleston Group Companies, ml were Douglas Orr of New Haven, Conn. and Martel S done by Hamlin-Steve nc.*





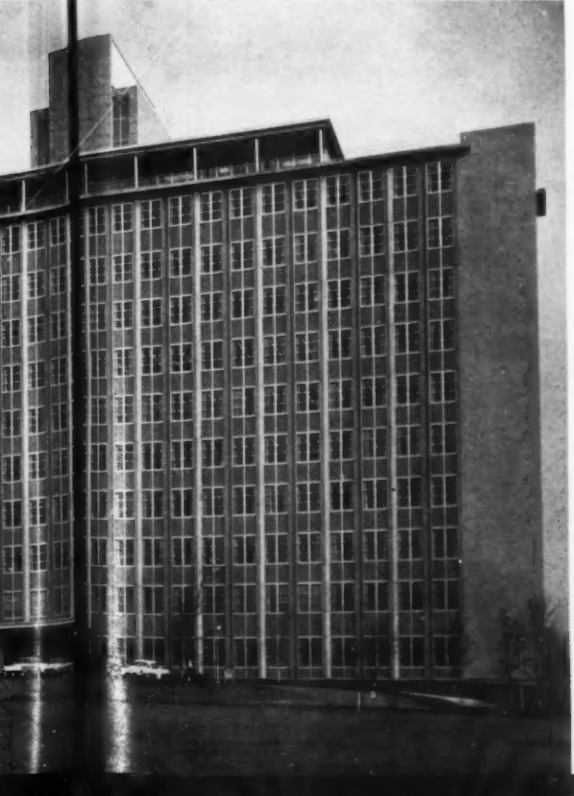

*llow and dark blue porcelain enamel make is sign designed by Bianculli & Palm, attanooga, Tenn., stand out. The sign was bricated and porcelain enameled by South-ern Advertising Inc. of Chattanooga.*



*A. C. Spark Plug Plant, Milwaukee, Wis. The architect was the Argonaut Realty Div. G. M. Corp. and the porcelain enameler was Hamlin-Stevens of Fairfield, Conn.*

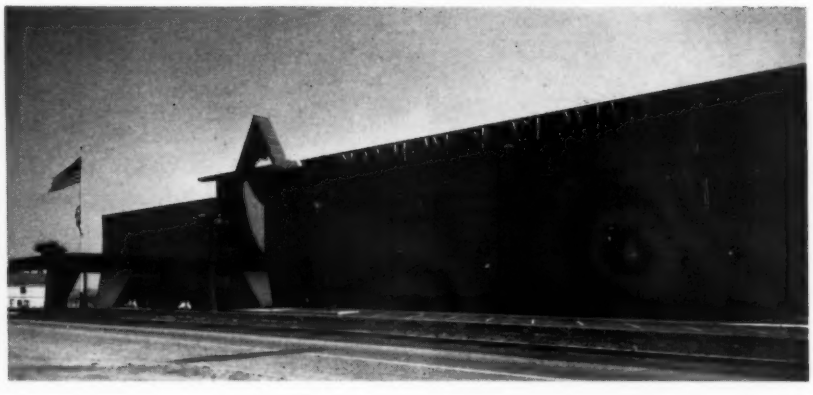

*panies, mbia Gas System, Charleston, W. Va. Architects d Marter Son of Charleston W. Va. Porcelain enameling was lin-Steve nc., Fairfield, Conn.*

*Cast aluminum cookware in porcelain enamel by Club Aluminum Products Co. of La Grange Park, Ill. is available in a wide range of types and sizes and two colors — turquoise and red. The porcelain enamel on aluminum tile in the bathroom below are the work of Vikon Tile Co. of Washington, N. J.*



## More products . . .

*Mulholland-Harper of Philadelphia produced these signs shown at the exit end of the Lincoln Tunnel in New York City (r.). At the North American Aviation plant in Inglewood, California (right center) California Metal Enameling Co. of Los Angeles produced the canopy, bird sign, letters, trim panels and louvers. Any one of four colors can be had on the skillet, shown below, produced by The Spartan Co. of Minneapolis.*

*New Hampton Roads Tunnel linking Hampton and Norfolk, Va. has a ceiling made of porcelain enamel on aluminum which was produced by Halrick, Inc. of Danbury, Conn.* (Photo Courtesy Dupont Magazine). *The sign below produced by Argosy Industries, Inc. of Middletown, Conn. demonstrates the adherence and flexing qualities of porcelain enamel on aluminum.*

## Test methods

→ *from Page 39*

### Abrasion resistance

Section IV of the PEI bulletin T-2, "Test for resistance of porcelain enamels to abrasion" (a tentative standard) is recommended. It has been suggested that an additional volume index (standard index divided by density of the porcelain enamel) be reported to indicate a compensation for wide variations in density. Equipment required is as follows: An accurate balance, an apparatus for operating the specimens in a horizontal circular motion and a test circle 7/8 inches in diameter. The apparatus must have an accurate timing device also. Retaining rings of metal lined with rubber measuring 1-3/16 inches high and 3-7/16 inches in diameter and alloy balls .536 of an inch in diameter are used. Abrasives should be number 80 corundum. Test specimens should measure 4.33 inches square.

Procedure: Each specimen is washed prior to weighing to determine initial weight. Each abrasive charge should be 175 grams of the alloy balls and 3 grams of the corundum along with 20 milliliters of water. When specimen is cleaned after fifteen minutes of abrasion it is weighed and then subjected to 30 and then 45 minutes of abrasion following the initial fifteen minute period. A weight loss curve is plotted from the results of these various time intervals of abrasion. A true rate of weight loss for each specimen is multiplied by an adjustment factor determined for the abrasion tester. Further details should be obtained from the PEI bulletin T-2.

### Chemical resistance

Acid solubility is determined by the boiling acid resistance test as found in "Commercial standard CS100-47, porcelain enameled steel utensils" and ASTM C283-54 "Standard method of test for resistance of porcelain enameled utensils for boiling acid." The test consists of a 7-per cent solution of citric acid or 5 per cent tetrasodium pyrophosphate, in the case of the alkali test, for a period of two and a half hours. The loss of weight in milligrams per square inch is the test factor. Note: (The PEI Quality Development committee is at this time evaluating a new apparatus and test method on alkali resistance.)

### Color measurements

Standard samples in non-fading material and visual comparison under at least two light sources (yellow incandescent and blue fluorescent) often serve the requirements. Standard color booths with two light sources may be purchased. Readings from a Tristimulus Reflectometer such as a color difference meter will serve to give a mathematical notation for control purposes. Visual matching must be used in conjunction with the meter when types of material and coloring chemicals are different.

### Gloss measurements

Measurement of specular gloss as described in PEI bulletin T-18, "Gloss test for porcelain enamels," may be defined as the fraction of light flux reflected in the direction of mirror reflection (the specular direction) when the sample is illuminated by a parallel beam of light. In the case of enamels, the angle of incidence (and reflection) is taken as 45 degrees. Multiplied by 1,000, the gloss is given in conventional "gloss units". The specular gloss for enamels is the fraction of light energy, in parts per thousand, reflected at 45 degrees when the specimen is illuminated at 45 degrees.

### Spall test for adherence

The specimen is immersed at room temperature in a 5 per cent by weight freshly-prepared solution of CP ammonium chloride and distilled water. Deformed samples are recommended for standard procedure. Exposure time of 96 hours for normal samples and 24 hours for deformed samples are recommended with at least 25cc's of solution per square inch of sample. Samples on 0.064 inch thickness aluminum with maximum coating of 0.004 inch thickness on one side only are deformed by bending 180 degrees over a 3/4 inch diameter mandrel with the coating on the external surface. Edges are filed to expose enamel metal interface before deforming. Larger diameter mandrels may be practical for thicker aluminum or thicker coatings. Further specifications for spalling are being formulated by PEI.

### Torsion resistance

Results are obtained as described in PEI bulletin T-5, "Torsion test for porcelain enameled iron and steel," but with the difference that aluminum measures 0.051 inches and over in thickness and coatings measure 0.005 inches in thickness. The test blanks should measure 11 7/8 inches long and 2 inches wide. Blanks are formed into a 90 degree angular specimen with a radius of bend of 1/8 inch inside using commercial V dyes or bending bars. The apparatus is a specially-engineered torsion tester described in PEI bulletin T-5. The torsion tester is set at zero and then rotated.

The torsion test is commenced by rotating the specimen 40 degrees and observing if chipping occurs along the apex of the 90-degree specimen. Failures within 1/2 inch of the grips are not considered. If the torsion resistance of the specimen is greater than 40 degrees, a wet sponge is stroked along the specimen in order to maintain a visibly wet film on the surface. The results for 10 specimens in a single determination are plotted with degrees torsion (T) versus enamel thickness (t) on C rectilinear graph paper. Further information on determination of test results should be obtained from bulletin T-5.

### Thickness measurements

Micrometer readings prior to application and micrometer readings after the coating is applied serve to indicate thickness. When original thickness of the aluminum is unknown, or when coating is applied on each side, this method is not practical. Coating thicknesses can also be measured by eddy-current devices in which the frequency varies with the distance the coil or probe is displaced from the underlying metal. Instruments of this type compare this frequency with a reference frequency, the coating thickness being a function of the capacitance required to equate the two frequencies.

### Weather test

Samples of porcelain enamel on aluminum are being included in the new Porcelain Enamel Institute — National Bureau of Standards weathering test program. Specimens are being placed on exposure on six selected sites throughout the country.

Certain types of porcelain enamels are subject to color fading and outdoor exposure. These are predominantely shades of red and yellow. Freedom from discoloration when the surface is exposed to a few drops of 70 per cent nitric acid for fifteen seconds at room temperature is suggested as a test for fading. Work on a standard test for this aspect of porcelain enamel on aluminum is in progress by the PEI research associate at the National Bureau of Standards.

### Other evaluation areas being investigated

Four other areas of evaluation of porcelain enamel on aluminum that are still being considered by the subcommittee board are: dirt retention and cleanability; testing of adherence by deformation; strength of porcelain enameled aluminum; and scratch and gouge resistance.

# Market forecast

## for porcelain enamel on aluminum — three years — 1961

**Market Forecast**

| Market | Production in square feet 1961 |
|---|---|
| Building materials | 15,000,000 |
| Signs | 2,600,000 |
| Appliances and household equipment | 2,000,000 |
| Transportation | 600,000 |
| Utensils | 1,100,000 |
| Sanitary | 200,000 |
| Military and other | 1,500,000 |
| Total | 23,000,000 |

THIS STUDY REPRESENTS THE ANALYSIS of leading market research experts of the aluminum producing companies and the Commercial Research Subcommittee of PEI. In the final quarter of 1956, the subcommittee began the study of ways and means to forecast future usage of porcelain enamel on aluminum. Since no industry statistics were available for production in 1956 or earlier years, estimates were assembled for 1956 production and, using 1956 as a base, forecasts were projected for 1957 and 1961.

### 1956 production estimates

Approximately 3.5 million square feet of porcelain enamel on aluminum were produced in 1956 and 3.7 million pounds of aluminum were enameled. The building industry was by far the greatest single market for this material. About 2.4 million square feet were used in this area.

The balance of production of porcelain enamel on aluminum was used in a wide variety of applications. In the sign field, advertising and informational signs were produced as well as traffic control and highway signs.

In the housewares field, numerous cast aluminum products were introduced with a porcelain enamel finish.

### 1957 production

Production of porcelain enamel on aluminum in 1957 was expected to achieve 5.2 million square feet, a 50-per cent gain over 1956 production. The estimate was largely based upon greater market penetration in existing areas such as architectural applications.

### The outlook for 1961

Looking ahead to 1961, forecasts are based on the continued growth and expansion of porcelain enamel on aluminum, the estimated increase in size of the aluminum industry itself, and on other existing economic factors. The total market is expected to increase 500 per cent to 23 million square feet by 1961.

Continued increase in the use of existing applications in the building field is predicted for the next three years. In addition, potential building applications that take advtantage of the wide color availability, light weight, and maintenance-free characteristics of the material will become more numerous.

The tremendous highway construction program is expected to play an important role in expanding the sign market during the next three years. A second factor is the expected continued growth in the use of porcelain enamel on aluminum for standard traffic signs, street markers, and other identification applications such as permanent product emblems and instruction placques.

By the forecast date of 1961, it is predicted that porcelain enamel on aluminum will have penetrated into the automotive industry. Also foreseen is the expanded use of the material in the manufacture of sanitary ware for aircraft, trains, and house trailers, where weight is an important factor.

In summarizing, the research authorities look forward to the next three years as being a continuation of the product and market development. It is predicted that many new uses and applications will come into being, utilizing this versatile material's properties of light weight, non-fading colors, and permanent protection of the metal base.

# Tentative specifications

## porcelain enamel on aluminum as used for signs and architectural applications

THESE SPECIFICATIONS cover porcelain enamel on aluminum for use on architectural panels, siding, framing, trim, etc., and on signs and similar products principally for outdoor exposure.

*Basis metal*

The basis metal shall have an aluminum-alloy surface capable of being porcelain enameled to meet the specifications herein.

*Finish*

The finish shall be porcelain enamel bonded to metal by fusion at a temperature above 800° F. All surfaces exposed to the weather shall be porcelain enameled.

*Thickness of coatings*

The thickness of the porcelain enamel coatings on exposed surfaces shall be in the range of .0025 inches to .007 inches after firing. Methods for measurement of thickness of coating are described in Porcelain Enamel Institute Bulletin AL-1a, Section 8, "Thickness measurement" and on page 39.

*Spall resistance*

All poreclain enamel coatings shall be able to withstand the "Spall test to determine the retention of adherence" without failure. This test is described on page 43.

*Acid resistance*

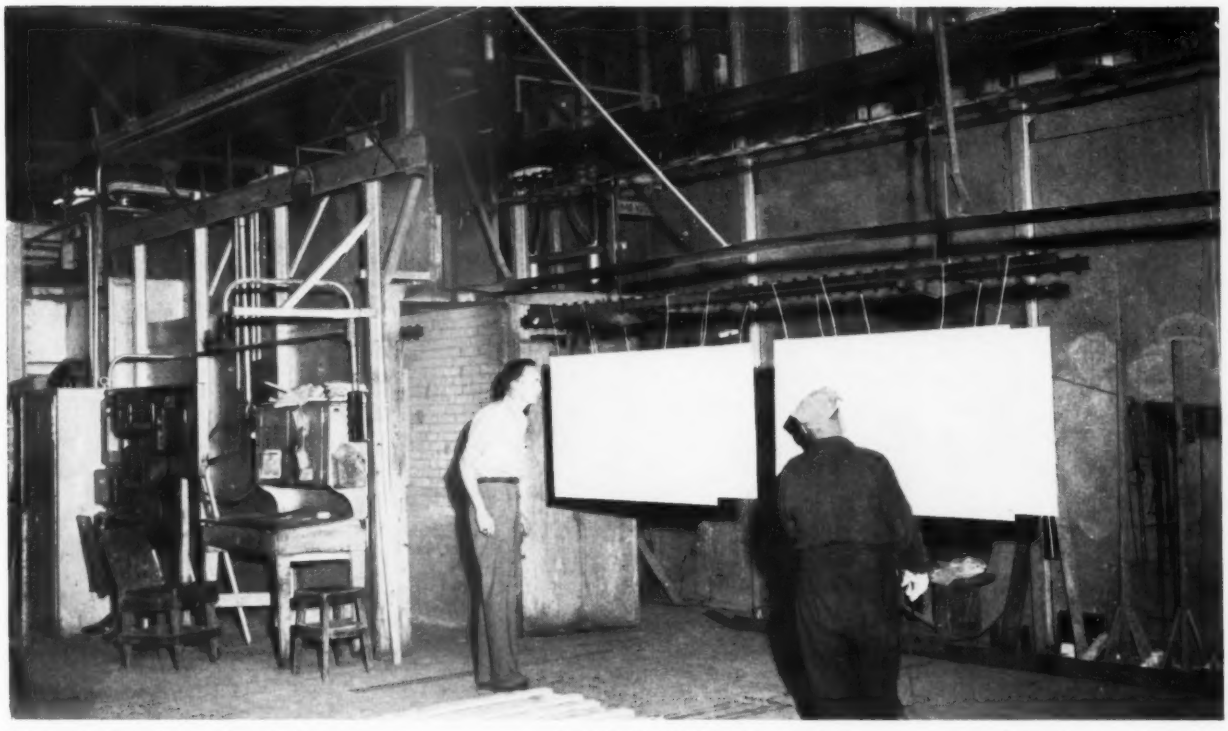
The porcelain enamel shall have acid resistance of Class B or better when tested by the "Test for acid resistance of porcelain enamels." This test is described on page 39 and in Porcelain Enamel Institute Bulletin T-7, or ASTM Standard C282-53, "Standard methods of test for acid resistance of porcelain enamels."

*Color retention*

The porcelain enameled surface shall not show objectionable discoloration or fading when subjected to a few drops of 70 per cent nitric acid for 15 seconds. A light stain as allowed for Class A resistance is satisfactory.

*Abrasion resistance*

The porcelain enamel shall have a sub-surface abrasion volume index of not over 7, when tested according to "Test for resistance of porcelain enamels to abrasion," Part IV (Sub-surface abrasion). This test is described in Porcelain Enamel Institute Bulletin T-2 and on page 43. Volume index is obtained by dividing mg. per minute by density of the porcelain enamel (Porcelain Enamel Institute Bulletin AL-1a, Section 2, "Abrasion resistance").



*Firing is done in an electric furnace at a temperature of 980° F. Firing time varies from six to twelve minutes, depending on gauge of material. The preheating stage is at 800° F. for a period equal to that of firing.* MPM PHOTO

# How Ing-Rich porcelain enamels aluminum

## one of the innovators in the field — methods and techniques

*AN MPM STAFF FEATURE*

MPM EXCLUSIVE FEATURE

Ingram-Richardson has made a well known and respected name for itself in the architectural porcelain enamel field. Originally a sign manufacturer, "Ing-Rich," as it is known to many, has progressed to the position it now enjoys by continually improving every phase of manufacturing.

The company is located in Beaver Falls, Pennsylvania near the hub of one of the country's great industrial centers — Pittsburgh. Though signs are still manufactured here, Ingram-Richardson now concentrates more heavily on complete architectural panel installations and chalkboards.

Ing-Rich was one of the first to realize the potential of porcelain enamel on aluminum, and accordingly, set up one of the first production lines for this new product. Existing equipment, such as the furnace and the ball mills, was adapted where necessary to accommodate aluminum enameling production. This will be explained later in the article.

Four or five years ago, porcelain enameling of aluminum was in an embryonic period of development from the standpoint of production methods. Inherent processing difficulties never present in the enameling of steel were vexingly present in the enameling of aluminum. Mere handling of the aluminum became a problem since even slight scratches showed through the fired enamel. Cleaning was difficult because many available cleaners that would do the job were too powerful for the alkaline-sensitive aluminum.

Other processing difficulties that were causing concern were the narrow range of set and specific gravity obtainable in the slip because of the naturally high alkalinity of the enamel's composition. And this same high alkalinity prevented normal steel enameling drying practice. Too much drying caused tearing and also permitted the slip to attack the surface of the aluminum sheet.

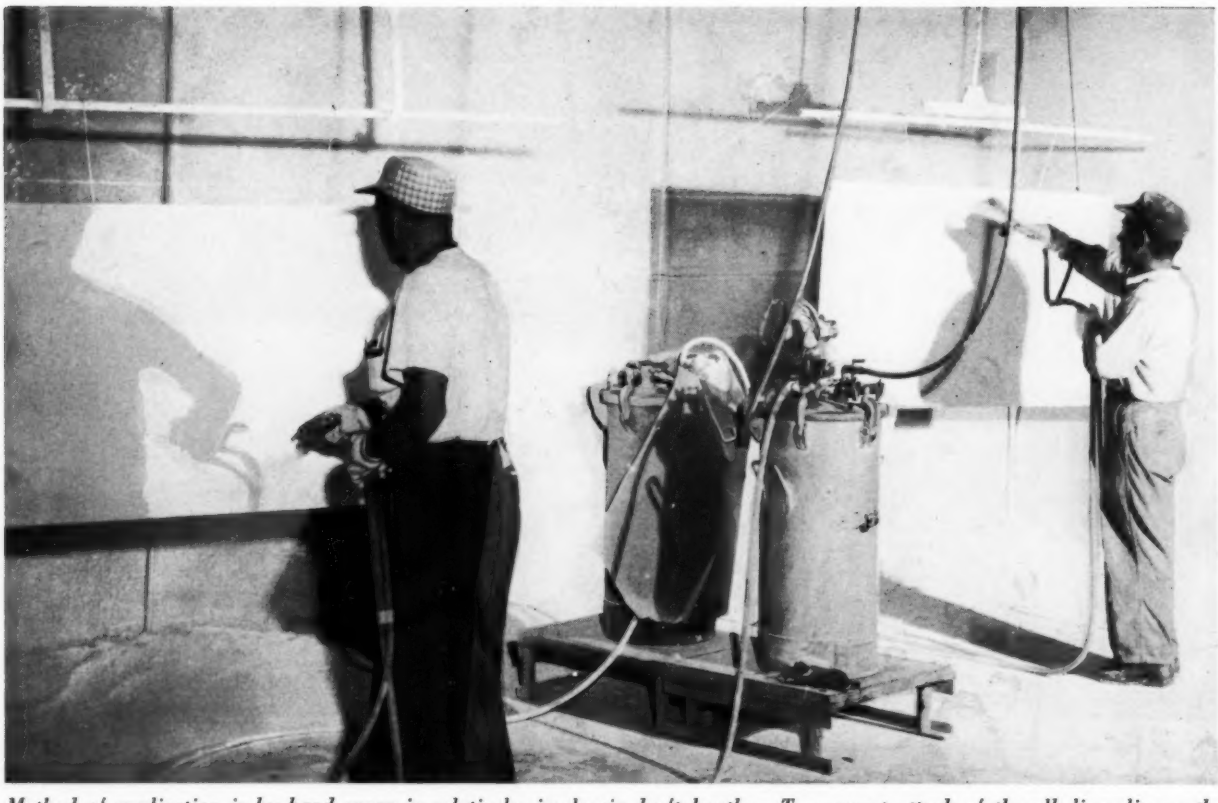
These problems are still with enamelers of aluminum, but increased know-how and better materials have eased the situation.

The entire process of enameling aluminum at Ingram-Richardson has been continually brought up-to-date in accordance with the most recent developments in the field. A few of the techniques that were developed are considered by some to be due to the originality in thinking prevalent at this plant.

### Handling the aluminum stock

Practically all of the aluminum sheet stock used in the operation is purchased with protective paper interlayers to minimize scratching due to handling.

Several weeks supply of aluminum is



*Method of application is by hand spray in relatively-simple air draft booths. To prevent attack of the alkaline slip on the surface of the aluminum, no more than a half hour may elapse between application and firing. Pieces are conveyed into furnace in almost a wet state.* EXCLUSIVE MPM PHOTO

stored on pallets, ready for use, and moved to fabrication by lift trucks as required. All fabrication at the plant consists of cutting to size or punching and notching as required.

### Metal preparation

Cleaning or pickling is done in the same room with steel, but in separate tanks. Batch type cleaning is used here, partly because of available space and the flexibility of a batch set-up.

The first tank contains a mild alkaline cleaner that does not etch the aluminum. It is used for all aluminum parts. On extruded parts and patterned sheets, a second alkaline cleaner is used which etches the surface of the aluminum to a slight degree. This second cleaner is used on parts that have irregular surfaces and are not easily cleaned with the milder solution. The temperature of the non-etch cleaner is maintained at 170° F, with an immersion time of 10 minutes. A temperature of 130° F, and an immersion time of 5 minutes, is used for the etching cleaner.

After each immersion in cleaning solution, the panels are rinsed in room temperature water.

The final two stages of aluminum preparation consist of an integrated process, the first of which is a solution of sulfuric acid and chromic acid to remove what aluminum enamelers call "smut." This solution is maintained at 180° F or above, and the time of immersion is 5 minutes. The dark scum or "smut" is a layer of precipitated iron, copper, silicon and their oxides which were present in the alloy being cleaned. It is caused by the action of the alkaline cleaner, particularly the uninhibited type.

### Air-agitated cleaning tanks

All of the cleaning solution tanks at Ing-Rich are air agitated to promote contact of the cleaning solution with the metal.

The last and most critical cleaning solution is the caustic chrome bath. The tank temperature is kept at room level. The reason this last operation is critical is because the caustic chrome works as a neutralizer to the chrome sulfuric bath.

The dipping of the aluminum into the caustic chrome is merely "in and out" so that only the surface is alloyed with chrome. Immediately after this, the parts are rinsed thoroughly, first in an over-flowing water tank and then, by hand, with a hose to assure that the water stops the action of the solution on the aluminum.

All handling of the aluminum sheets is done with white cotton gloves, since even the slightest fingerprint may cause spalling of the enamel after firing.

### Milling and preparation

Two essential differences exist between the preparation of slip for steel and aluminum. The first of these is that mill additions must be very carefully handled to keep the specific gravity and the set of the slip at just the proper level for application. The other difference is in the temperature of milling itself. Temperatures in excess of 90° F allow too much of the alkaline components in the composition to be dissolved. Ordinarily, what happens later is attack of the aluminum and tearing of the enamel due to excess alkalinity.

Mill additions are also critical in the preparation of enamels for aluminum. At the present time, the frit suppliers are working on new methods of adding compounds for the purpose of controlling set and specific gravity. One of the most promising is a so-called dry and wet method which consists of adding

*Fired panels are carefully inspected for uniformity, color match, and overall quality before shipment.* EXCLUSIVE MPM PHOTO

part of the addition before milling and the remainder after the mill is unloaded. The advantage of this method is to reduce the amount of the alkali going into solution during milling and still provide the proper amount of alkali for maintaining set and specific gravity.

Fineness is controlled to 0.1 — 0.5 grams retained on a 325-mesh screen with a sample of 100 grams for architectural applications and chalkboard enamels.

The method used at Ing-Rich to keep the temperature of the mills below 90° F is two-fold, and consists of spraying water onto the mills during milling, and to adjust the ratio of the high density grinding balls and the weight of the batch.

### Application and firing

The method of application at Ing-Rich is by hand spray in relatively-simple air draft booths.

Since no more than a half hour can elapse between application and firing, to prevent attack of the alkaline slip on the surface of the aluminum and tearing of the bisque itself, the pieces to be fired are conveyed into the furnace in almost a wet state.

Firing is done in an electric furnace at a temperature of 980° F. The total firing time varies from six to twelve minutes, depending on the gauge of material. The pre-heating stage is at 800° F for an equal period as at the peak, 980° F firing temperature.

Time in each zone of the furnace is controlled by moving the chain intermittently as required by the schedule.

The furnace used for firing porcelain enamel on aluminum at Ing-Rich was originally designed for continuous firing at temperatures in the 1500° F range. After many tests, a satisfactory schedule was devised for aluminum, so that good results could be obtained .

### Heat source two-fold

There is a dual heat application in the furnace used, according to Ing-Rich operators. The source is infra-red generated by the nickel chrome elements, and the secondary source is convection. The cross section size of the inside of the firing chamber and the positioning of the infra-red heating elements are responsible for the convection effect when firing at 980° F.

The firing cross section is 24 inches in width by 84 inches in height. The heating elements are positioned in four separate element banks.

Each of these banks is controlled separately to obtain the desired heating effects. The convection effect results because of the position of the heating elements and the 84-inch height of the firing zone. Ing-Rich operators feel that the effect of convection heating promotes color uniformity and enables the firing of odd-shaped parts such as extrusions and embossed panels. Ing-Rich operators envision that when a lay-down type oven is constructed for them in the future, some means of forced convection, in conjunction with an infra-red heat source, would be the most desirable form of firing for porcelain enamel on aluminum.

### Careful inspection

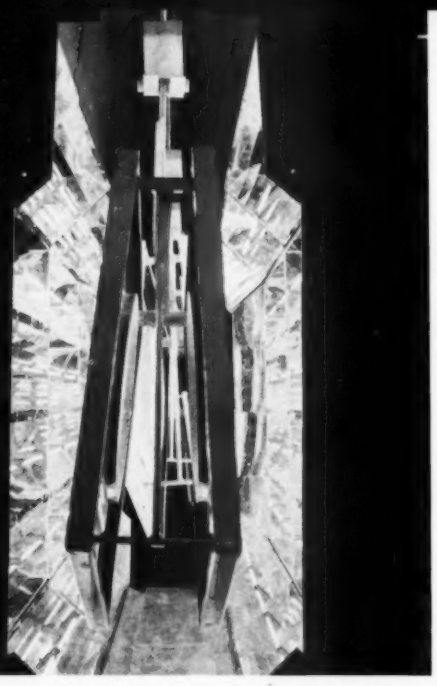
Each of the fired panels is carefully inspected for uniformity, color match, and overall quality.

## Porcelain Enamelers of Aluminum

Argosy Industries, Inc. (Tags, Labels, Signs)
North Main and Grove Sts., Middletown, Conn.
Bradley Neon Porcelain Corp. (Signs, Job Enameling)
618 South Higgins Ave., Missoula, Montana
California Metal Enameling Co. (Job Enameling)
6904 E. Slauson Ave., Los Angeles, California
California Neon Products (Signs, Job Enameling)
2514 El Cajon Blvd., San Diego, Calif.
Donwell Corp. (Tags, Labels, Signs)
19 Pleasant St., Manchester, Conn.
Enamel Products Co. (Job Enameling)
500 Eddy Road, Cleveland, Ohio
Erie Enameling Co. (Job Enameling)
1400 W. 20th St., Erie, Pa.
Foster-Jacob, Inc. (Signs, Job Enameling)
422 N. Adams St., Peoria, Illinois
Halrick, Inc. (Job Enameling)
31 Crosby St., Danbury, Conn.
Hamlin-Stevens, Inc. (Job Enameling)
2082 Kings Highway, Fairfield, Conn.
Ingram-Richardson Mfg. Co. (Job Enameling)
Beaver Falls, Pennsylvania
Kawneer Co., The (Architectural Porcelain)
Niles, Michigan
L. & M. Co., Inc. (Signs, Job Enameling)
4515 Oates Road, Houston, Texas
Marveon, Inc. (Job Enameling)
3532 Riverdale Road, Ogden, Utah
Monarch Aluminum Mfg. Co. (Utensils, Job Enameling)
Detroit Ave., Cleveland 2, Ohio
Mulholland-Harper Co. (Signs,, Job Enameling)
5820 Tacony Street, Philadelphia, Penna.
Porce-Alume Co. (Job Enameling)
Lake Park Blvd., Alliance, Ohio
Porcelain Steel Corp. (Job Enameling)
Connersville, Indiana
Porce-Len, Inc. (Job Enameling)
31 Haig Street, Hamden, Conn.
Seaporcel Metals, Inc. (Job Enameling)
28 — 20 Borden Ave., Long Island City, N.Y.
Shaffer Sign Service, Inc. (Signs, Job Enameling)
502 Datura St., West Palm Beach, Fla.
Southern Advertising Co. (Signs, Job Enameling)
1141 Market Street, Chattanooga, Tenn.
Spartan Company (Utensils, Job Enameling)
2900 Emerson Ave., S., Minneapolis 8, Minn.
Stolle Corporation, The (Job Enameling)
Park Street, Sidney, Ohio
Vikon Tile Corp. (Wall Tile, Job Enameling)
Washington, New Jersey
Vitri-Finish, Inc. (Job Enameling)
18525 Railroad St., La Puente, California
Wallace Neon Limited (Signs, Job Enameling)
717 E. Hastings St., Vancouver 4, B.C., Canada

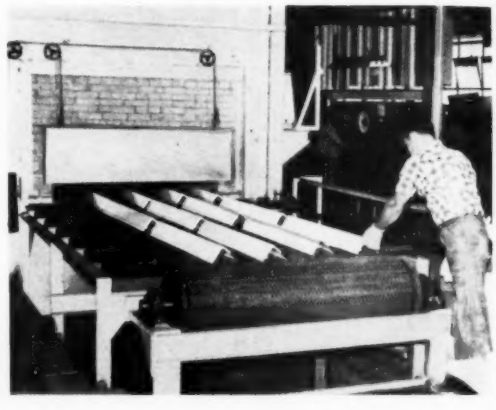
# Typical furnaces for firing porcelain enamel on aluminum

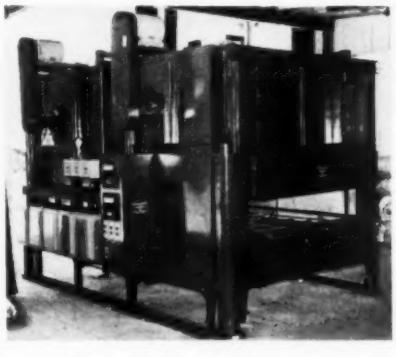
**besides the types shown here it is also possible to fire with gas-fired refractory burners**



*An infra-red vertical furnace that is designated for firing porcelain enamel on aluminum. Horizontal furnaces of the same type are also available. This type of infra-red furnace is made up of standard basic sections, utilizing the linear quartz filament lamp. These infra-red furnaces are designed to operate at high efficiencies and to stand up in service without excessive maintenance. Photo Courtesy Fostoria Pressed Steel Corp.*

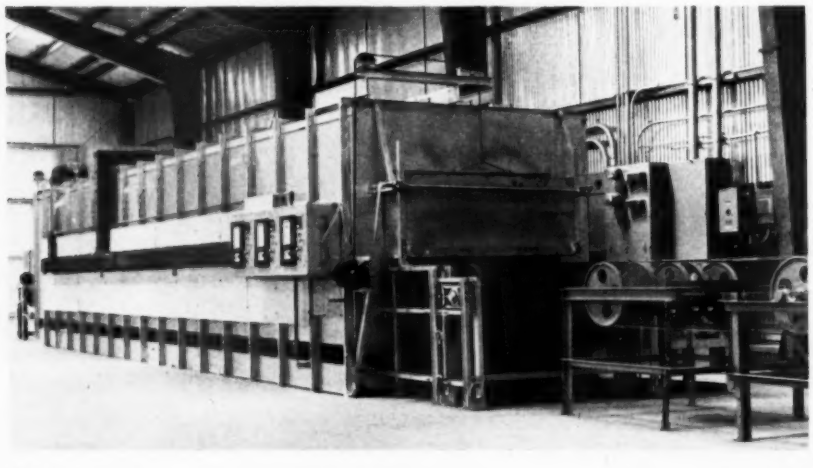
*The laydown furnace at Porcelain Steel Corp., Connersville, Ind., has recently been altered thus: pre-heat zone to operate at 1000°F.; added 90 KW of nickel-chrome electric sheath heaters above mesh belt with gas fired radiant tubes remaining below the belt; length of 1st and 2nd zones now 22½ ft. inside. (Story appeared October 1956 in finish) Exclusive* MPM *photo.*





*This package furnace for porcelain enameling aluminum is prefabricated and is designed to handle 270 sq. ft. per hour. It is an electrically heated convection type furnace designed to operate at 1000° F. to within plus or minus five degrees F. Photo Courtesy Ferro Corp.*

*Furnace used for firing at VitriFinish Inc. It measures 40 ft. in length and is heated by quartz infra-red tubes. It can be controlled to 1000°F. plus or minus five degrees. Exclusive* MPM *Photo.*



## Suppliers of Porcelain Enamel Frit for Aluminum

In response to an MPM survey of porcelain enamel frit manufacturers, the following companies have indicated that they are in position to serve the industry with porcelain enamel frits for aluminum:

American Lava Corp., Chattanooga, Tenn., a subsidiary of Minnesota Mining and Manufacturing Co.

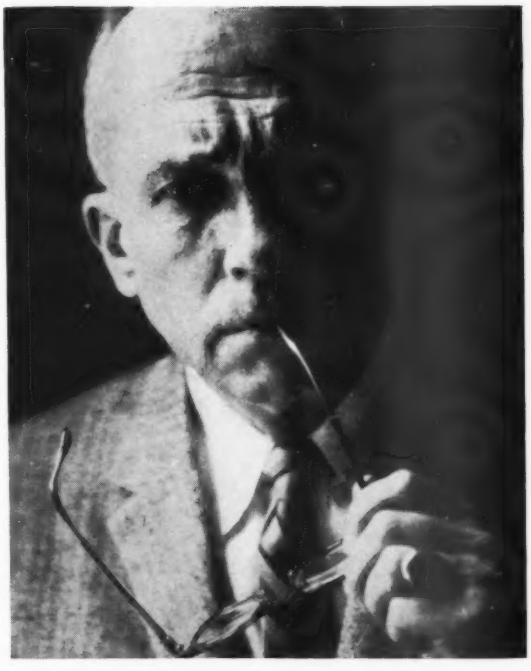
E. I. Du Pont De Nemours & Co., Electrochemicals Department, Ceramic Products Div., Wilmington 98, Delaware.

Ferro Corp., 4150 E. 56th St., Cleveland 5, Ohio.

The O. Hommel Co., 209 Fourth Ave., Pittsburgh, Pa.

Pemco Corp., 5601 Eastern Ave., Baltimore 24, Md.

Vitro Manufacturing Co., 60 Greenway Drive, Pittsburgh 14, Pa.



# What can Porcelain-Enameled Aluminum do for me ?

## It may be just the difference your products need for higher profits in these competitive times

Today's market demands new designs, new ideas to give your products added sales appeal. Porcelain-enameled aluminum may be the very "difference" you need. Here is a material that stimulates the creative imagination of the designer. It adds lasting color to such varied applications as cabinets, home appliances, wall tile, highway signs and curtain wall panels for buildings.

Consider how these properties of porcelain-enameled aluminum might improve your products: unlimited range of colors, finishes and textures; can be cut, sheared, punched or sawed *after* enameling; excellent resistance to fading, weathering, temperature extremes, alkali, mild acids, salt water; no progressive spalling.

Du Pont pioneered porcelain-enameled aluminum, works closely with enamelers throughout the country in developing new and improved uses for this versatile material. Contact one of the highly skilled enamelers listed below. Du Pont will work with you and your enameler to help you make the most profitable use of porcelain-enameled aluminum.

**These enamelers are widely experienced in the porcelain enameling of aluminum**

*. . . can meet your most exacting specifications:*

Argosy Industries, Inc.
Middletown, Conn.
Bradley Neon Porcelain Corp.
Missoula, Mont.
Calif. Metal Enameling Co.
Los Angeles, Cal.
California Neon Products
San Diego, Cal.
Cronoflash Company
Oakdale, Pa.
Donwell Corp.
Manchester, Conn.
Enamel Products Co.
Cleveland, Ohio
Erie Enameling Co.
Erie, Pa.
Foster-Jacob, Inc.
Peoria, Illinois
Halrick, Inc.
Danbury, Conn.
Hamlin-Stevens, Inc.
Fairfield, Conn.
Industrial Equipment Mfg. Co.
Riverton, N. J.
Ingram-Richardson Mfg. Co.
Beaver Falls, Pa.
The Kawneer Company
Niles, Michigan
L. & M. Co., Inc.
Houston, Texas
Lansdale Porcelain Enameling Corp.
Lansdale, Pa.
MacArthur Co.
St. Paul 14, Minn.
Marveon, Inc.
Ogden, Utah
Monarch Aluminum Mfg. Co.
Cleveland 2, Ohio
Porce-Alume Co.
Alliance, Ohio
Porcelain Steel Corp.
Connersville, Indiana
Porce-Len, Inc.
Hamden, Conn.
Seaporcel Metals, Inc.
Long Island City, N. Y.
Shaffer Sign Service, Inc.
West Palm Beach, Florida
Southern Advertising Co.
Chattanooga, Tenn.
Spartan Company
Minneapolis 8, Minn.
The Stolle Corporation
Sidney, Ohio
Vikon Tile Corporation
Washington, N. J.
Vitri-Finish, Inc.,
La Puenti, Cal.
Wallace Neon Ltd.,
Vancouver 4, B. C., Can.

**DU PONT PORCELAIN ENAMELS**
for aluminum

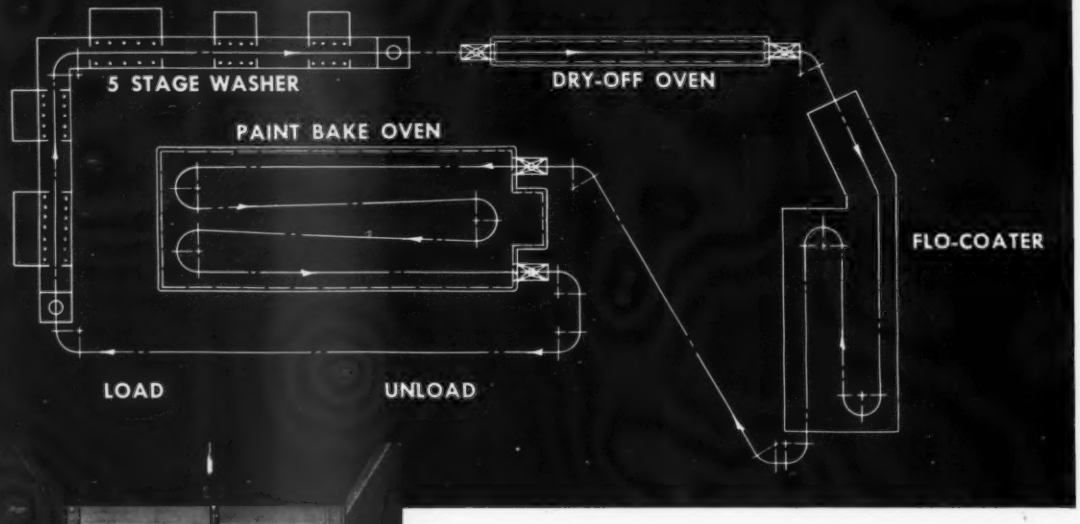
DU PONT
REG. U.S. PAT. OFF.

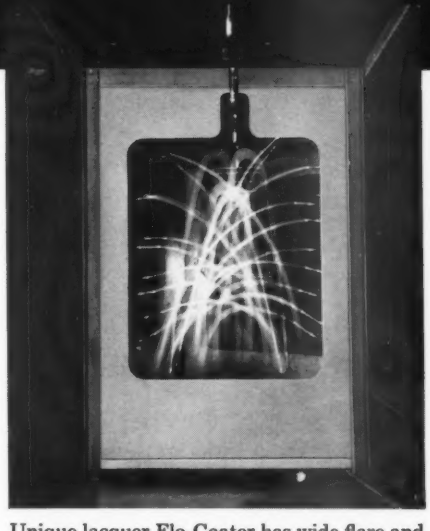
BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

**ELECTROCHEMICALS DEPARTMENT**
*Ceramic Products Division*

**E. I. DU PONT DE NEMOURS & CO. (INC.)**
*Wilmington 98, Delaware*

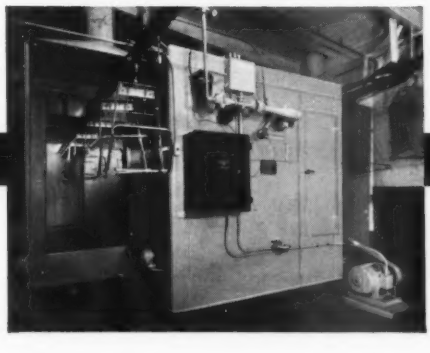
# INTEGRATED



Unique lacquer Flo-Coater has wide flare and long flow path to suit the product—supermarket shopping carts and baskets. Compact MOCO installation gives substantial savings in coating materials over other systems.

Air-jet "curtains" at entrance and exit of MOCO baking oven act as a barrier against heat loss. The system is fully equipped with electronic flame failure safeguards.



## Finishing Systems– *Cost Controlled* for Modern Production

*Integrated* Finishing Systems are more than just a plan and installation designed to meet the customer's needs in materials, space and output. At Michigan Oven, engineering a cost-controlled finishing system means equipping for today's demands, and for tomorrow's production.

The lacquer Flo-Coating system illustrated above is a complete and efficient system. Behind its installation lies a thorough study of the plant, of the product, of quality control and initial investment.

This finishing system will pay for itself in a relatively short time. It's engineered for economy, low maintenance and safety—and it will adapt readily to future expansion at low cost.

Send for a free MOCO bulletin showing typical finishing system applications, including products, process and specifications, or write for the name of the MOCO representative nearest you.

**MICHIGAN OVEN COMPANY**

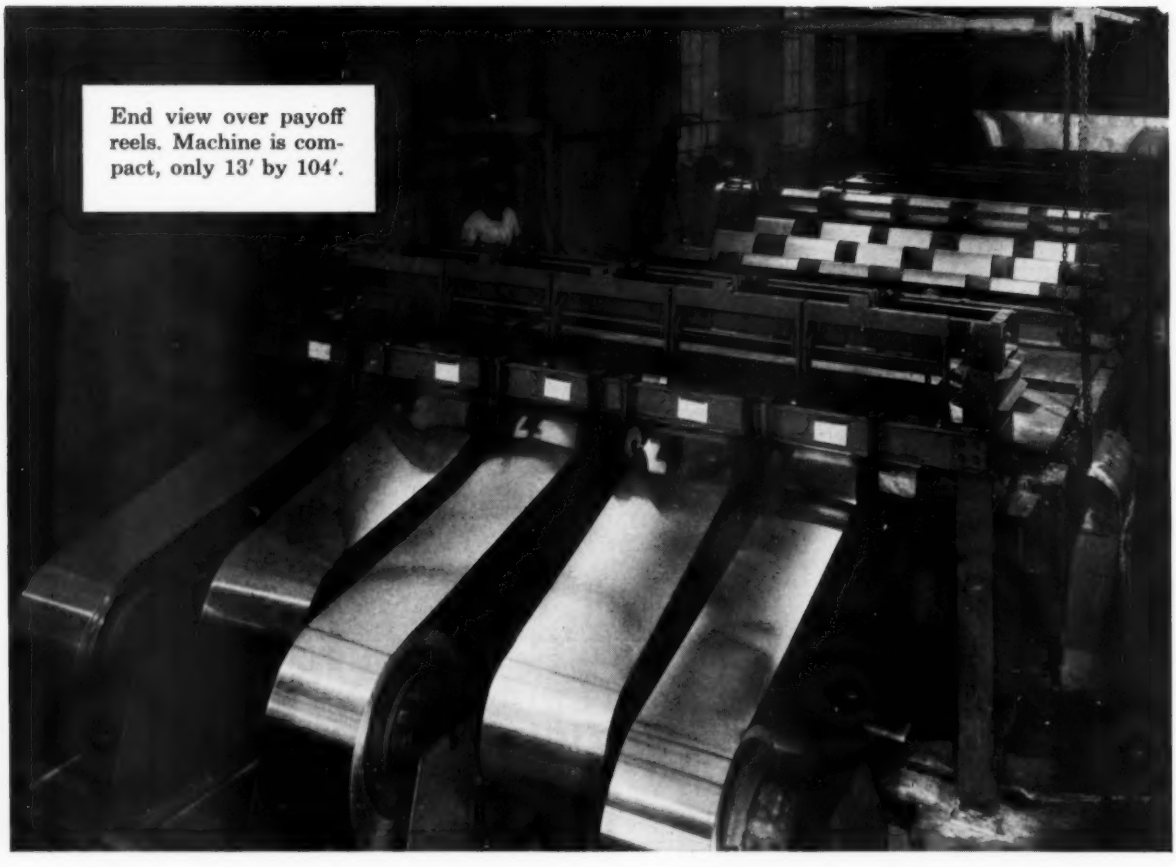
F-1

MOCO

FINISHING EQUIPMENT DEPARTMENT

411 BRAINARD, DETROIT 1, MICHIGAN

Washing Machines • Bonderizing Units • Dry-off Ovens • Dip Tanks • Spray Booths • Flo-coaters • Finishing Ovens • Conveyors



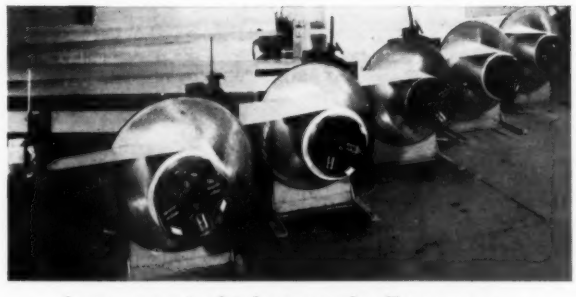
End view over payoff reels. Machine is compact, only 13′ by 104′.

# New Meaker Anodizing machine delivers uniform high quality plus versatility

This Meaker anodizing machine was built to meet the requirements of the Allmetal Weatherstrip Company. It handles aluminum strip in widths up to 18″, thicknesses from .0071″ to .032″, and at speeds from 2 to 6 FPM. In the illustration above, five strips are running simultaneously at 3 feet per minute, producing a total of 900 lineal feet of anodized and waxed aluminum every hour.

Meaker engineered and supplied this installation complete with every detail, including: a 6000 ampere generator, refrigerating unit, ice bank, hot air blowers, payoff and take-up reel systems, and the Meaker-built anodizing and wax dip unit itself.

Why don't you take advantage of Meaker's complete service when you need plating and anodizing equipment . . . it's backed by a reputation for building the best for 50 years.



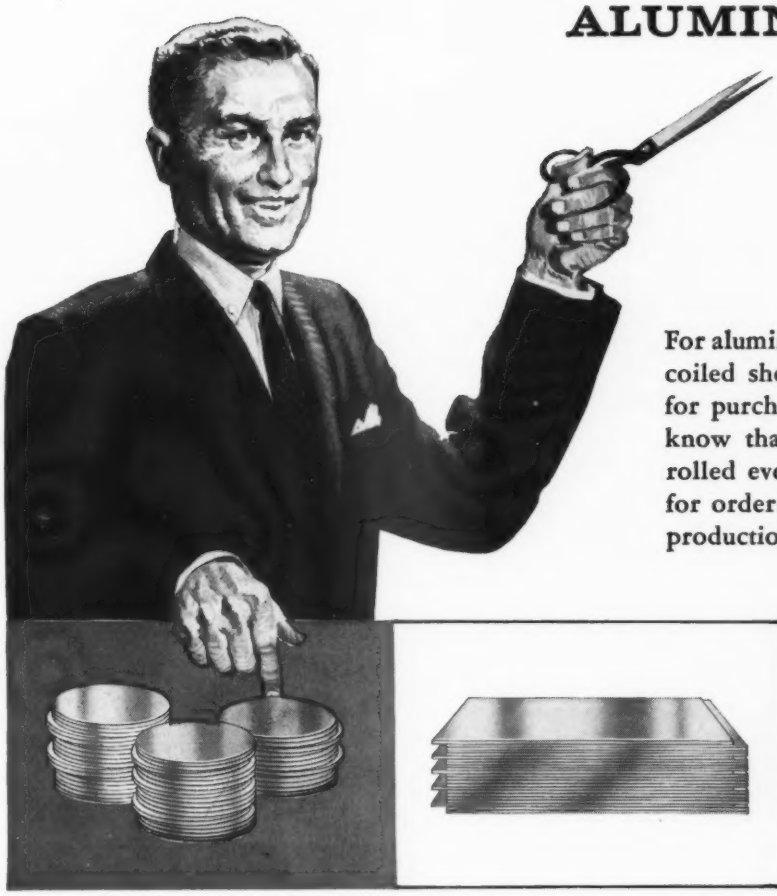
Arrangement of take-up reels allows easy removal of aluminum rolls to forming operations.

**MEAKER**

**Write for further information**

**THE MEAKER COMPANY** • 1629 S. 55th AVE. CHICAGO 50, ILL.

# Cut Dollars Out OF FAIRMONT ALUMINUM SHEET



For aluminum sheet in any form—flat sheet, coiled sheet or circles—those responsible for purchasing and manufacturing should know that every alloy Fairmont offers is rolled every working day . . . no waiting for orders to accumulate for scheduling a production run.



*This Means:*

- Less delivery lead time between ordering and shipment—speeding delivery and close integration with other production elements. Overnight delivery is frequently possible.
- Manufacturing inventories are kept low, reducing investment in floor space and work in progress.
- Fabricators' change orders, if necessary, may be executed rapidly and economically.

Fairmont's customized attention to all orders, both large and small, has merited an association with an ever growing list of customers over the past 32 years.

**For a free copy of Fairmont's latest technical bulletin, write or call today.**

**Sales Offices in Principal Cities**

**FAIRMONT** ALUMINUM COMPANY

SUBSIDIARY OF CERRO DE PASCO CORPORATION

Dept. P-6 Fairmont, West Virginia

# One coat does the job of two with Lowe Feuzon

Here's another example of what can happen when one of Lowe Brothers finishing engineers understands your problem. Check this engineer's report:

**"The paint department foreman said that it was necessary to apply 2 or 3 coats for good coverage — especially when the metal had dark spots. He tried an order of Feuzon Gray Metallic and found it covered beautifully with one coat. When he has used up the competitive material in stock, he'll order our Lowe Feuzon."**

Lowe Brothers finishing engineers are trained to find ways to cut painting costs. They're experts on paints *and* finishing methods. Your nearby engineer will gladly make a "flow-chart" analysis of your finishing system. No obligation. Just send the coupon.

**LOWE BROTHERS**
**INDUSTRIAL FINISHES**

QUALITY UNSURPASSED SINCE 1870

*Style-tested paints for Home and Industry*

**REPRESENTATIVES IN:** Chicago, Ill. • Jersey City, N. J. • Pittsburgh, Pa. • Dayton, Ohio • Milwaukee, Wis. • Cincinnati, Ohio • Springfield, Mass.
Boston, Mass. • Cleveland, Ohio • Rochester, N. Y. • Columbus, Ohio • Indianapolis, Ind. • Detroit, Mich. • Philadelphia, Pa.

**The Lowe Brothers Company**
**Dayton 2, Ohio**

MPM

☐ Please have my nearest Lowe Brothers Finishing Engineer call on me as soon as possible.

NAME_____

TITLE_____

FIRM NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

# NEW INDUSTRIAL LITERATURE

## Thermostatic Valves for Combination Washer Dryers

It is now said to be possible to add a greater range of temperature selection to automatic washer-dryers for the ultimate performance in washing the new synthetic fabrics. A new water mixing valve reportedly aids in the design of an automatic washer-dryer with five temperatures plus one auxiliary temperature for operation of dryer condensor or accessories. In addition, these switches are said to be virtually bounceless, and they are exceptionally resistant to shock and vibration. For the booklet on these switches, ask for Buletin 270, Dept. MPM, Detroit Controls Div., American-Standard, 5900 Trumbull Ave., Detroit 8, Mich.

## Chemical Conversion Coatings for Aluminum

Bulletin 1424-A of the American Chemical Paint Co. deals with their line of protective and prepaint coating chemicals for aluminum. Write Dept. MPM, American Chemical Paint Co., Ambler 1, Pa.

## Enameling Iron Booklet

A complete catalog is available describing how porcelain enamel parts can be made to high quality standards. An enameling iron described, was created specifically for porcelain enameling. It is said to have excellent resistance to sag and maintains a dimensional stability under high firing temperatures. In forming, fewer strains are reportedly set up in the metal, and good welds are easily obtained. For the catalog entitled "Armco enameling iron," write Dept. MPM, Armco Steel Corp., 2778 Curtis St., Middletown, Ohio.

## Spray Booth Catalog

This catalog describes how this line of standardized spray booths save on assembly costs. Prefabricated parts bolt together to form a rigid, self-supporting structure. Wide selection of sizes and types. Ask for Spray Booth Catalog I-7000, Dept. MPM, The DeVilbiss Co., Toledo 1, Ohio.

## Geared Press Bulletin

Just issued, Bulletin 66A presents the modernized Series SE Straight Side, Single Action, Eccentric Geared Presses for large, heavy-tonnage drawing, punching, and blanking work, according to the manufacturer. Profusely illustrated with detail drawings and photographs, this catalog gives thorough information on operating and design features, including: Rugged all-steel, four-piece, tie rod frame; box-type welded steel slide; crankless eccentric drive; pneumatic friction clutch and brake; etc.

Standardized in one-, two-, and four-point suspensions with 100 through 1,250-ton capacities, the Series SE presses are available in 130 models. For your free copy of Bulletin 66A, write Dept. MPM, Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.


## Movie on Color in Industry

A second motion picture, on the subject of color, "Color Magic," has been released for showings to industry, college and artist design groups throughout the country. A new 22-minute sound movie illustrates some of the more important principles involved in using color in industry, in design and in the home. Arrangements for borrowing this 16mm film may be made through Dept. MPM, Interchemical Corp., 67 W. 44th St., New York 36, N.Y., or any Interchemical representative.

## New Catalogue on Bending Machines

A new catalogue is available on bending machines with illustrations of many previously unpublished applications. The catalogue, which is designated as #356, has over 90 photograph illustrations of bending machines showing over 65 different applications in bending tubing, pipe, extrusions and rolled sections.

A brief discussion of bending practices precedes the catalogue information. Photographs throughout the catalog show over 50 different tooling set-ups in closeup. Write Dept. MPM, Pines Engineering Co., Inc., 601 Walnut St., Aurora, Ill.

## Catalogs on Air and Hydraulic Cylinders

Brand new 8-page catalogs on air and hydraulic cylinders, respectively, are now available. Complete information is given on how these cylinders can best be used in any manufacturing operation. Contact Dept. MPM, Lindberg Air & Hydraulic Div., Teer, Wickwire & Co., Jackson, Mich.

## Free New Bulletin and Solenoid Selector

A complete booklet describing the many applications of solenoids is available, along with a solenoid selector that quickly and easily matches a solenoid to a specific application. Applications include valve actuation, clutch operation, switch function, metering devices, shutter and damper control, and many other operations. For the free bulletin and solenoid selector, contact Metal Products Manufacturing, York St. at Park Ave., Elmhurst, Ill.

## Choose Your Press Drawing Lubricants With Care

An eight-page brochure of a talk given by Leon Salz, manager of the Lubricants Division of the Magnus Chemical Co., is entitled "Choose Your Press Drawing Lubricants with Care." The brochure covers components of drawing lubricants and gives a complete classification of press drawing compositions. A recommendation chart shows the required lubricant for stamping, shallow drawing and deep drawing of carbon steels, alloy steels, stainless steels, aluminum, copper, brass and bronze. For your free booklet, write Dept. MPM, Lubricant Div., Magnus Chemical Co., Inc., South Avenue, Garwood, N. J.

## Finishing system builds sales

→ *from Page 27*

is supplied by its own 200 gallon paint storage tank equipped with automatically-controlled gear pumps for paint and solvent circulation.

Viscosity is maintained at 24[Sd] by automatic control of solvent addition with the pumping system. Provision is made for a refrigeration unit and heat exchanger, built into the pumping system to maintain the paint temperature constantly at 80° F.

Pitched plates on the floor of each section return unused paint, un-contaminated, and un-aerated, through a motor-driven filter to the storage tank.

One of the outstanding economies of our change from dipping to flow coating is a substantial savings in paint. With greater efficiency in operation, and a higher percentage of paint utilization, we are able to effect close to $1,000 in monthly savings. The ability to apply paints of higher viscosity without tearing and sagging is the result of precise controls in the flow-out tunnel into which the work is conveyed immediately following painting.

### Flow-out tunnel controls solvent vapor

The flow-out tunnel is 50 ft. long, providing for a 12½-minute drain at a conveyor speed of 4 fpm (or an 8-1/3-minute drain, if we choose to speed up the system to 6 fpm). The floor is pitched up for 2/3 the length of the tunnel for maximum recovery of paint which flows back, through a motor-driven filter, into the tank of the proper color.

Uniform paint film, without tears or sags, is achieved in the flow-out tunnel where the precisely-controlled solvent vapor concentration holds evaporation to a minimum until the sags and tears have vanished, and the paint has levelled itself prior to curing.

The entire unit consisting of the tandem flow coater and the flow-out tunnel is protected against fire by a built-in $CO_2$ system.

### Roof top curing oven

After leaving the flow-out tunnel, parts are conveyed through a completely-enclosed tunnel up to the 80-ft. long curing oven, located on the roof. The gas-fired convection oven cures the paint at 400° F for 20 minutes (at 4 fpm), discharging the work, brilliant and dry, ready for the journey back down into the factory for unloading.

### Materials handling

Loading and unloading take place at 2 stations, centrally located for easy access. To facilitate loading and unloading, the conveyor dips to within 5 feet of floor level over an 8-foot deep pit, permitting even our longest parts (up to 8'3" in length) to be handled by operators at floor level.

By working closely with equipment design engineers. we were able to devise a single conveyor rack suitable for handling all of the hundreds of different sizes and shapes of parts, permitting a random mix of parts in process without any conveyor changeover.

The 600 feet of conveyor which serves as our new finishing system threads through a processing area which actually requires less floor space than our outmoded degreasing-wiping-dipping operation, yet it provides a productive capacity over four times greater!

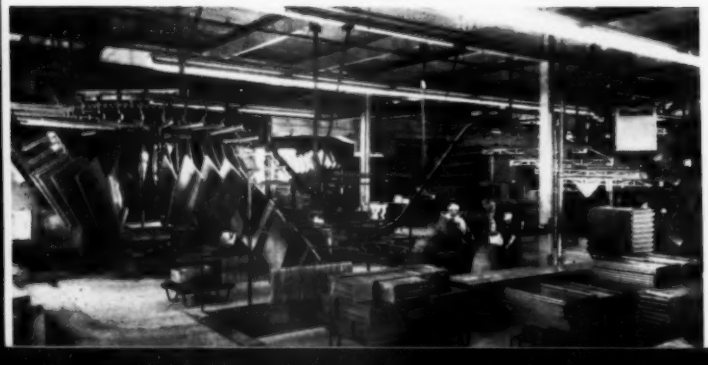
### Immediate sales benefits

From a manufacturing point of view, our new finishing system helped us achieve our immediate objectives — to increase productive capacity, and to reduce costs.

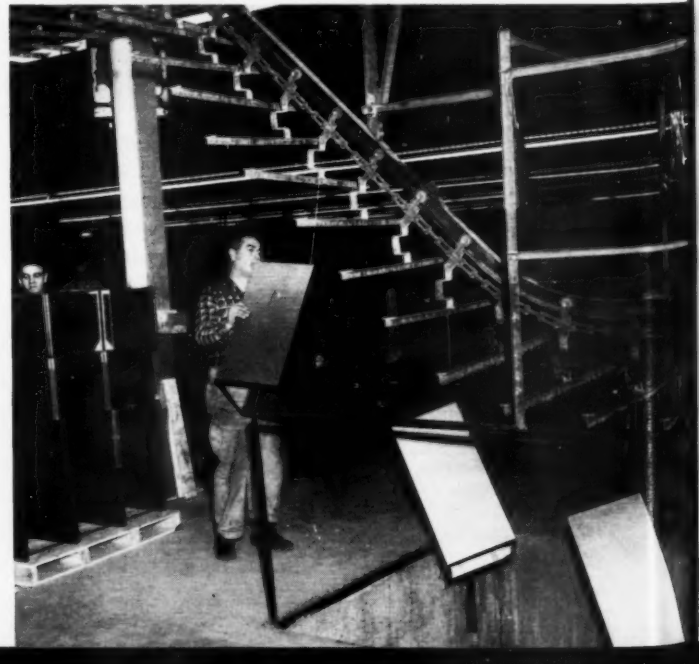
From a sales point of view, there were benefits also. We were able to support our sales, sales promotion, and advertising efforts with benefit facts which made real sense to buyers. We were able to: 1) Reduce corrosion 2) Exceed Government specifications 3) Improve paint adhesion 4) Produce a more lustrous finish.

Actual experience in the months that have followed the installation of our new finishing system demonstrates with dramatic sales increases the advantage we have gained by being able to make such statements.

The facts to fortify this new sales appeal are developed almost every foot of the way along the 600-foot route of our new system, beginning with the washer-phosphatizer.



*(Left) — Cabinets entering tandem 2-color flow coater; building at right is paint storage house. (Lower left) — Wide -angle view of the finishing system illustrates compact floor plan. (Below) — Loading cabinets prior to processing. Note pit at lower right permitting longer parts to be handled easily at floor level.*



## Norge Employees Recalled

Plans to immediately increase employment by over 600 people in three Norge plants were announced recently by Judson S. Sayre, president of the Norge division. This will bring the total employment increase in all Norge plants to 1216 since June of this year.

"These additional employees were necessitated by the heavy order demands from distributors and dealers for the entire line of appliances introduced by Norge's 'Creative Engineering for Sales' program," Sayre said. He also stated that this program has been responsible for the firm's largest single month's sales, which was July, in the past two years.

## Paint Industries Show to be Largest to Date, Report

The Paint Industries' Show of 1958, scheduled to be held in the Cleveland Public Auditorium, Cleveland, October 6-8, is reported to become the biggest show in the 23-year history of the annual exhibit, which is held concurrently with the annual meeting of the Federation of Paint and Varnish Production Clubs.

One hundred and fort-nine exhibit spaces, occupied by 92 exhibitors, will bring to Federation members and guests the latest developments in equipment and raw materials, the most recent technological information, and an opportunity to meet and talk to the technical personnel of suppliers.

## New Process for Fabrication of Ceramic-Clad Metal Structures

Vitro Corp. of America has been awarded a patent on a process for making ceramic-clad metal structures to combine the temperature, corrosion, and oxidation resistance of ceramic materials with the structural strength of metals.

The patent covers the electrophoretic deposition and bonding of ceramic materials to a metal body by interposed graded coatings of metal and ceramic materials.

In electrophoretic deposition, an electrostatic field is established between two electrodes immersed in a colloidal dispersion of charged particles causing migration of the suspended particles to one of the electrodes. The particles produce an adherent coating on the electrode.

It is claimed that the process offers exceptional uniformity of coating thickness and compactness as compared with conventional applications, and that irregularly-shaped objects are coated with excellent uniformity and reproducibility of coating.

Three other patents awarded to Vitro at the same time cover application by electrophoresis of a low friction coating, method of forming a high friction element, and a method of forming a sacrificial lubrication layer.

## Roper Range Sales Up

Geo. D. Roper Corp. sales for the 28 weeks ended July 12, 1958 were $15,791,847, compared with $15,364,-895 for the same period last year. For the same period, the net profit was $27,868, compared with a loss of $248,598 before taxes last year.

The Kankakee, Ill. firm reports that the sale of the new Rotis-O-Grill, a top-of-the-range combination rotisserie and grill, is exceeding sales estimates.

## Industrial Furnace Orders Up

July net new orders for industrial furnaces totalled $5,169,000, up 29 per cent from the June volume of $3,672,-000, according to the Industrial Heating Equipment Association, Inc. July was the best month for the industry in ten months, and the only month in which business exceeded $4 million since September of last year. Business for seven months of 1958 amounted to $22,971,-000, a decline of 52 per cent from the $47,679,000 volume in the same period of 1957.

## Trade-Wind Purchased by Robbins & Myers

Robbins & Myers, Inc., Springfield, Ohio, electric motor manufacturer, has purchased Trade-Wind Motorfans, Inc., Pico Rivera, Calif. The sales force of Trade-Wind will remain intact, but will be directed from the Hunter Div., Robbins & Myers, Memphis, according to Frank S. Brady, general manager of the Hunter Div., and vice president of Robbins & Myers.

## Lyon Enters Office Desk and Table Field

Lyon Metal Products, Inc., Aurora, Ill., is entering the desk field with a line of office desks and tables which, it is claimed by the manufacturer, is primarily a general purpose, quality desk, economy-priced. The new line will be sold through Lyon's regularly-established dealers from coast to coast.

The new items announced include a full size, 60" x 30" double-pedestal desk; a 42" x 30" single-pedestal desk; and a companion model 60" x 30" conference table.

## Singleton Elected 29th NEMA President

J. L. Singleton, vice president, Industries Group, Allis-Chalmers Mfg. Co., Milwaukee, Wis., was elected the 29th president of the National Electrical Manufacturers' Association recently to fill the unexpired term of the late W. V. O'Brien, who died June 21. Singleton has been a member of the NEMA board of governors since 1952, and has served as an association vice president since 1955. He will serve in his new post until the association elects its 1959 officers at the annual meeting in Atlantic City this November.

## Whirlpool Launches "Best of Both" Bonanza

Three valuable grand prizes, plus hundreds of weekly prizes, will be awarded to retail salesmen of RCA Whirlpool home cleaners in the newly-announced "Best of Both" Bonanza.

The program, announced by home cleaner sales manager Gene Neff, will be built around a 10-week series of mailers presenting sales tips on how to sell RCA Whirlpool home cleaners, thus offering a sales training course in addition to the opportunity to be a winner of merchandise prizes. The weekly phase of the program is based on random phone calls to salesmen around the country with questions to be asked about the sales tips given in the mailer received that week. Correct answers will permit the salesman to choose one of a number of weekly prizes offered.

## Carrier Corporation Alters Market Policy

Carrier Corporation's unitary equipment division, maker of self-contained air conditioners, has announced that it is abandoning its policy of annual model changes, and labeling models by years. Aimed at simplifying marketing, the

## METAL PRODUCTS STATISTICS

**a current report on available production, shipment and sales figures for important products in the appliance and fabricated metal products manufacturing field**

| | | 1958 (Units) | 1957 (Units) | % Change |
|---|---|---|---|---|
| Gas Water Heaters | July | 218,700 | 192,500 | +13.6 |
| | Jan.-July | 1,554,900 | 1,525,500 | + 1.9 |
| Gas Ranges, Built-In | July | 15,700 | 13,200 | +18.9 |
| | Jan.-July | 113,200 | 105,600 | + 7.2 |
| Gas Ranges, Free-Standing | July | 115,900 | 124,200 | - 6.7 |
| | Jan.-July | 882,200 | 1,002,700 | -12.0 |
| Gas Furnaces | July | 67,700 | 57,100 | +18.6 |
| | Jan.-July | 387,000 | 352,000 | + 9.9 |
| Gas Fired Boilers | July | 11,600 | 10,000 | +16.0 |
| | Jan.-July | 52,300 | 49,300 | + 6.1 |
| Gas Conversion Burners | July | 11,600 | 15,200 | -23.7 |
| | Jan.-July | 60,700 | 65,700 | - 7.6 |
| Electric Refrigerators | July | 279,700 | 318,000 | -12.0 |
| | Jan.-July | 1,764,700 | 2,121,800 | -17.3 |
| Electric Freezers | July | 119,700 | 109,100 | + 9.7 |
| | Jan.-July | 613,300 | 580,300 | + 5.7 |
| Electric Ranges, Free Standing | July | 57,500 | 56,700 | + 1.4 |
| | Jan.-July | 457,500 | 557,200 | -17.9 |
| Electric Ranges, Built-In | July | 41,000 | 32,000 | +28.1 |
| | Jan.-July | 285,000 | 246,200 | +15.8 |
| Electric Storage Water Heaters | July | 79,000 | 64,000 | +23.5 |
| | Jan.-July | 476,500 | 456,700 | + 4.4 |
| Electric Dishwashers | July | 33,100 | 27,400 | +20.7 |
| | Jan.-July | 217,200 | 218,700 | - 0.7 |
| Electric Food Waste Disposers | July | 49,100 | 40,100 | +22.4 |
| | Jan.-July | 331,800 | 296,300 | +12.0 |
| Combination Washer-Dryer | July | 7,829 | 10,145 | -23.0 |
| | Jan.-July | 72,680 | 102,115 | -29.0 |
| Washers, Automatic & Semi | July | 212,208 | 272,549 | -22.0 |
| | Jan.-July | 1,392,225 | 1,583,312 | -10.0 |
| Washers, Wringers & Others | July | 65,079 | 68,366 | - 5.0 |
| | Jan.-July | 462,655 | 515,354 | -10.0 |
| Electric Dryers | July | 54,557 | 52,035 | + 5.0 |
| | Jan.-July | 326,333 | 380,497 | -14.0 |
| Gas Dryers | July | 20,956 | 18,405 | +14.0 |
| | Jan.-July | 135,725 | 161,889 | -16.0 |
| Vacuum Cleaners | July | 263,778 | 218,276 | +20.8 |
| Metal Furniture | June | * | * | + 1.0 |
| | Jan.-June | * | * | - 5.0 |
| Television | July | 279,010 | 250,362 | +11.2 |
| | Jan.-July | 2,456,662 | 3,236,737 | -25.0 |
| Radio | July | 488,495 | 597,484 | -15.0 |
| | Jan.-July | 3,452,833 | 4,236,453 | -21.0 |
| Compressor Bodies | Feb. | 328,760 | * | -25.0 |
| | Jan.-Feb. | 856,504 | * | -15.0 |
| Steel Barrels & Drums | June | 2,678,624 | 3,123,265 | -16.0 |
| | Jan.-June | 15,440,876 | 18,629,871 | -18.5 |
| Steel Pails | June | 6,775,443 | 6,948,622 | -21.0 |
| | Jan.-June | 35,233,422 | 38,258,173 | - 9.0 |
| Typewriters | July | 102,037 | * | * |
| | Jan.-July | 598,316 | * | * |

* Not Reported

Sources for this information: Gas Appliance Manufacturers Association, National Electrical Manufacturers Association, American Home Laundry Manufacturers Association, Vacuum Cleaner Manufacturers Association, National Association of Furniture Manufacturers, Electronic Industries Association, and Air-Conditioning and Refrigeration Institute, U.S. Dept. of Commerce.

move will take time to complete, since some 1959 models are too far advanced in development and promotion, according to Russell Gray, divisional vice president and general manager.

While the main purpose of the move is to prevent obsolescence because of slight changes in models, new models will be brought out when significant advances in design and performance warrant, the report states.

### New Whirlpool Washer-Dryer Combination

A new washer-dryer combination announced by Whirlpool Corp., St. Joseph, Mich., is said to provide safe laundering of any fabric with wash temperatures of cold, warm, medium, or hot, and either cold or warm rinses. Drying temperatures available are high, medium, low, delicate, and air (room temperature).

Available in electric (EC-50) or gas (EC-55) models, the new RCA Whirlpool washer-dryer has a built-in water heater which is said to assure the right wash temperature. Because of the exclusive Filter Stream washing and rinsing action, which washes clothes with water rather than in water, consumption of water and detergents is low. Twelve gallons of both hot and cold water (plus whatever amount the fabric absorbs) are used in washing and rinsing a full 10-pound load.

### Lewyt Ad Campaign on Electronic Vacuum Cleaner

The Lewyt Corp., Long Island City, N.Y., is setting one of the biggest advertising campaigns in its history for introduction of the Lewyt electronic vacuum cleaner.

Full page magazine ads, combined with large space newspaper insertions, television and billboards, will spearhead the campaign, according to officials.

## INDUSTRY PERSONALS

**Paul A. Stewart,** who has been general manager of production planning for The Maytag Co., Newton, Iowa, has been appointed manager of manufacturing, succeeding L. C. McAnly, Sr. (retired August 29). The announcement was made by I. A. Rose, vice-president in charge of manufacturing for the appliance firm. Stewart joined the firm as general manager of product planning in November, 1952. This position will be abolished, and his duties will be absorbed by existing personnel.

**William H. Chaffee** has been appointed director of procurement of American Radiator & Standard Sanitary Corp., it has been announced by Joseph A. Grazier, president. He succeeds Thomas W. McNeill, who died early this year.

STEWART

CHAFFEE

**Dr. Schrade F. Radtke** has been named director for joint research program currently being initiated by worldwide lead and zinc producers. He has been chosen to manage research projects under the direction of the Industry Development committee of the American Zinc Institute, Inc., and the Lead Industries Association.

**Eric Hoagberg** has been appointed manager of the advertising and merchandising department of Kelvinator International. The appointment was announced by E. H. Wilcox, vice president in charge of Kelvinator export.

**F. James Franklin** has been promoted to sales manager of RCA Whirlpool home freezers, it was announced recently by officials of the firm. In his new responsibility, he will report to S. E. Sweet, general manager of the refrigerator division.

**Joe Marsalisi, Jr.** has been named district manager for Chambers Built-Ins, Inc., Chicago. The company markets a full line of built-in kitchen appliances.

**Walter W. Reed,** Kansas City, Mo., has been named director of public relations of the National Automatic Merchandising Association, according to C. S. Darling, executive director. Reed formerly was vice president and a director of Cumerford, Inc., Kansas City public relations counselors. NAMA is the national trade association of the automatic vending machine industry, with headquarters in Chicago.

**Donald D. Matney** has been named assistant sales manager of Chambers Built-Ins, Inc., Chicago, according to A. H. Scheffer, general sales manager. Matney was formerly with American Kitchens and Tracy Mfg. Co.

**Robert K. Miller,** former General Electric Co. executive, has been named president of the Holly-General division of The Siegler Corp., it has been announced by John G. Brooks, Siegler president. Prior to joining the firm, Miller was manager of General Electric's home heating and cooling department.

The appointment of **George R. Bates, Jr.** as manager of sales promotion for The Bettinger Corp., Waltham, Mass., was announced by Robert A. Weaver, Jr., president. Bates has been with Bettinger for five years, and previously was assistant to the general sales manager.

Appointment of **A. G. Handschumacher** to the newly-created position of corporate director of research and development for Rheem Mfg. Co. has been announced by A. Lightfoot Walker, president. Handschumacher continues in his post as vice president and general manager of Rheem's electronics division.

**Paul E. Roman** has been appointed director of marketing research for Norge Div. of Borg-Warner Corp., Chicago. He will supervise market analysis and consumer research, and will be responsible for the gathering, analysis, and interpretation of basic marketing information on Norge home appliances, the report states.

**I. A. Rose,** vice president in charge of manufacturing for The Maytag Co., Newton, Iowa, has been elected president of the Iowa Manufacturers' Association. **Robert E. Vance,** Maytag vice president and secretary, has been named to the board of directors, filling out the unexpired term of Rose.

# NEWS about Suppliers

## Dahlstrom Appoints Berg Representative

Dahlstrom Machine Works, Inc., 4227 W. Belmont Ave., Chicago, Ill., manufacturers of high speed strip and sheet fabricating equipment, announces the appointment of Stanley Berg Machinery Co., 1231 Banksville Rd., Pittsburgh 16, Pa., as their exclusive representative.

## Honeywell Factory Employes Turn Salesmen to Help Boost Business

In a unique "hometown selling" experiment, the 13,000 persons employed by Minneapolis-Honeywell Regulator Co. in its Minneapolis plants turned salesmen to help improve the firm's business, and in two months they sold more than $20,000 worth of controls.

Under a company-sponsored "Star Salesman" program, the employes, approximately 8,000 of them production workers, made a concerted effort in their off hours to influence friends, relatives, heating dealers, and builders to install all-Honeywell control systems in homes and other buildings.

A second two-month campaign has been started, with employes competing for three cash prizes to be awarded to the outstanding "Star Salesmen."

"We started this program as an experiment, and were really amazed by the effectiveness of our 'amateur' salesmen," said Tom McDonald, executive vice president of Honeywell. "They succeeded in influencing several builders and manufacturers who previously were unresponsive to our regular sales personnel."

*Payoff for top salesmen in unique Honeywell employe selling program is made by Tom McDonald (left), executive vice president. He is shown with (left to right) Donald F. Jaeger, top 'Star Salesman' in initial program; James H. Binger, Honeywell vice president; and B. C. Benson, who was second prize winner.*

## New Plastics Laboratory for Glidden

A new laboratory for plastics research and development will be established by Glidden in Cleveland, Ohio. Integrated with other research groups of Glidden's paint division, the combined groups will utilize the increasing similarities of paint and plastics to improve both lines of products. Primary efforts at the new laboratory will be devoted to research and development work in connection with the firm's Glidpol polyester resins for molding, casting, and coating operations; rigid polyurethane foams for insulating and structural applications under the brand name Glidfoam; and Glid-Rez butoxy resins for coating and casting. The new laboratory will be under the direction of Dr. H. J. Kiefer, coordinator of research.

## Reynolds Appoints Distributor

Hynes Steel Products Co., Youngstown, Ohio, has been appointed a general line industrial distributor for Reynolds aluminum products. Hynes is a supplier of metal to appliance and office equipment industries in the east and midwest. Its other major customers include automotive parts, toy, farm, and electrical equipment firms.

Founded in 1925 by John F. Hynes and John D. Finnegan, president and executive vice president respectively, the company is located at 3760 Oakwood Ave., Youngstown.

## Prices of Epon Resins Reduced

Shell Chemical Corp. has announced reductions of up to 20 per cent in the prices of its Epon resins. The new prices are retroactive to August 15.

The carload price of 1004, one of the solid resins, was dropped six cents, to 53½ cents a pound. Solid resins go primarily into surface coatings.

Shell hopes to increase the demand for its resins with the lower prices, according to George W. Huldrum, Jr., manager of the chemical sales division. "We think the reductions will lead to larger consumption in fields where the resins are now being used, such as surface coating, electrical potting, and plastic tooling. The lower prices also will open up new end uses," Huldrum said.

## Ferro President Honored With 25-Year Pin

Twenty-five years of service to the Ferro Corp., Cleveland, Ohio, was honored by the presentation by Robert A. Weaver, chairman, of a 25-year pin to Harry T. Marks, right, president, at the firm's recent board of director's meeting. Marks, a native of Canada, started with Ferro's Canadian subsidiary as plant superintendent in 1933. He later held the positions of export manager, managing director of Ferro-Brazil, vice president-foreign operations, and executive vice president. He was made president in January of this year following the death of C. D. Clawson.

## United Wallpaper Shows Gain in Sales and Profits

An upturn in demand for paint and wallpaper during the second quarter of the calendar year boosted United's sales and profits to a new high, according to S. U. Greenberg, president. United is a supplier of paints and industrial coatings to the fabricated metal products industry.

Sales for the three-month period ended June 30, 1958 were $13,745,702, compared to $11,733,532 during the like period last year, or an increase of 17 per cent. Profits increased during this period from $1,326,355 to $1,900,833, an increase of 43 per cent.

## Binks Moves New York Office to New Quarters

To improve the company's New York export facilities, and provide larger quarters for its factory branch, the Binks Mfg. Co. has moved to a newer and larger buliding at 35-42 41st St., Long Island City 1, N. Y., Burke B. Roche, president of the Chicago firm has announced.

According to E. J. Cremer, district manager for the company in the New

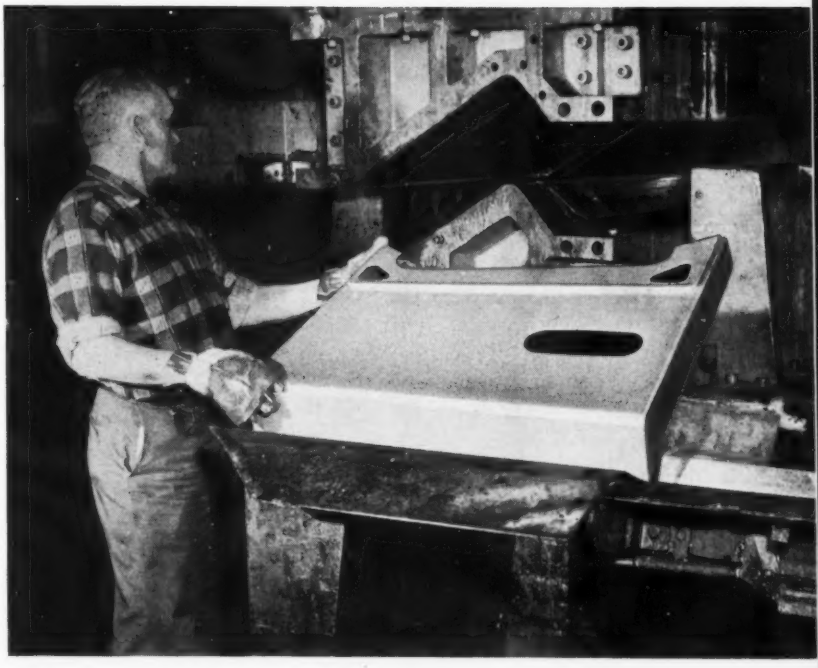

# Accent on excellence

## Youngstown enameling sheets

This press operator at Youngstown Metal Products Company—veteran producer of drawn stampings and fabricated parts for leading metal products manufacturers—is busy at work drawing tops for a well-known household washer-dryer combination.

He likes to work with Youngstown Enameling Sheets because they draw easily and due to their high metallurgical quality—provide continuous high-production runs of even the most difficult-to-form parts.

Wherever steel becomes a part of things *you* make, the high standards of Youngstown *quality*, the personal touch in Youngstown *service* will help you create products with an "accent on excellence".



THE
**YOUNGSTOWN**
SHEET AND TUBE COMPANY

*Manufacturers of Carbon, Alloy and Yoloy Steel, Youngstown, Ohio*

York area, the move will provide more up-to-date facilities and more room for warehouse and service departments. The company's New York office was formerly located on 41st Ave. in Long Island City.

## Gauges Record Coating Thickness, Control Processing

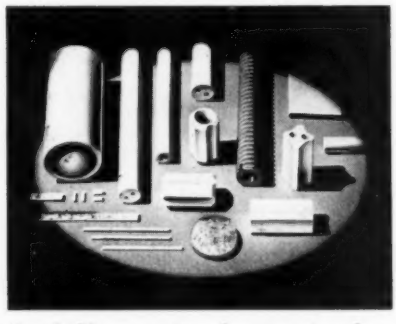
Radiation Counter Laboratories, Inc., 5121 W. Grove, Skokie, Ill., has appointed Stelios Regas to head a newly-formed industrial applications division, Dr. Ernest H. Wakefield announced. This division will specialize in the manufacture of nuclear density and thickness gauges for use in continuous process operations such as occur in applying coatings.

The gauges consist of a radioactive source, a detector, and apparatus which measures, indicates, and records the density or thickness of the material, and then feeds this information to associated equipment which automatically controls the manufacturing operations.

## Facilities Expanded for Crushable Ceramics

American Lava Corp. has expanded its production facilities for crushable ceramics, which are finding increasing in the electrical, nuclear, and electronic fields. They offer custom designs in a number of materials including magnesia, alumina, and zirconia.

Crushable ceramics are furnished to the dimensional tolerances and purity required for the individual application. Dimensional accuracy is controllable within reasonable limits without highly specialized handling. The ceramics are generally made in tubular forms in lengths up to 3 inches; however, cross sections other than round tubes and longer lengths can be supplied. Applications range from electric range elements to complicated thermo-nuclear uses.



*Crushable ceramics of magnesia, alumina, and zirconia are used in electrical, nuclear, and electronic fields for swaging inside sheath to assure uniform insulation between heating element or thermocouple and outer sheath.*

## 3M Brand Porcelain Enamel Now Available Nationally

3M brand porcelain enamel for aluminum is now nationally available through American Lava Corp., Chattanooga, Tenn., a subsidiary of Minnesota Mining and Manufacturing Co.

In making the announcement concerning national distribution, J. G. Breedlove, product manager of American Lava, stated that the porcelain enamel for aluminum as produced by the company is of the lead-free type. According to Breedlove, enamels have been developed that more nearly match the expansion coefficient of aluminum.

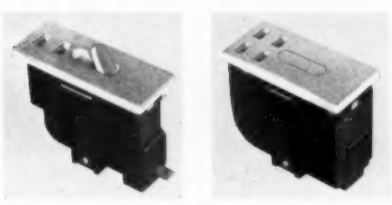
## Non-burning Paint Process

A new non-burning paint applied by a process called the Harding Hot Dip Paint Process is becoming popular in industry, according to the manufacturer. Formerly using black only, it has now been developed to a point where colors are being successfully applied. The process uses less than half the space of conventional paint dipping processes, and saves one-third or more of painting costs, it is claimed. These savings reportedly are accomplished by reductions in fire insurance rates, elimination of drip paint loss, elimination of wedging, controlled film thickness, and recovery of substantially all of the solvent used.

# Typical circuit breakers used in the appliance industry

The photos shown here illustrate some of the typical applications of circuit breakers in the appliance industry. This is presented as a sequel to the technical article, "Protective Circuit Breakers for the Appliance Industry," that appeared in August MPM, pages 26, 27 and 28.

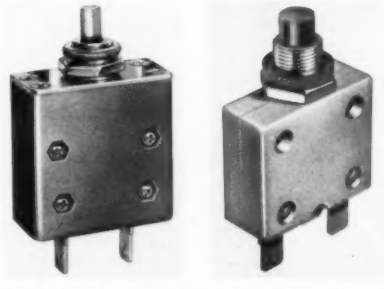
PHOTO COURTESY FEDERAL PACIFIC ELECTRIC CO.



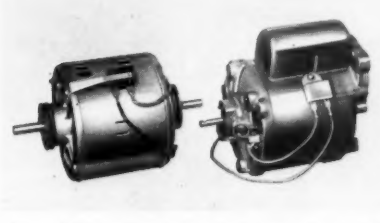
*The Recepta-Breaker — one showing a single outlet and the other with two receptacles — one timed and the other a regular outlet for range use. Its action is dual, that is, it cuts the current when either the temperature or the current are exceeded.*

PHOTOS COURTESY MECHANICAL PRODUCTS, INC.

*At left is the Mini-Breaker as a surface mounted motor protector and, at the right, is a cord end circuit protector.*



*At left, the Mini-Breaker for primary protection for convenience outlet on electric range and, at the right, a remote mounted motor protector.*



*A surface mounted motor protector, the Mini-Breaker, shown attached to motor with different types of brackets.*

## Porcelain enameled aluminum

→ *from Page 37*

BY *Benjamin Loring* EXECUTIVE VICE PRESIDENT
SEAPORCEL METALS, INC.

### Bright future for curtain walls

**The new trend to the use of porcelain-on-aluminum curtain walls effectively complements its established wide use and acceptance on steel — to the point that the architect's flexibility and design is once again extended.**

**Porcelain-on-aluminum, therefore, should further expand production by porcelain enamelers in the architectural products field. As a lightweight, non-corrosive, color-fast building product, it now offers the architect a versatile alternate to anodized aluminum. . . .**

**It is not anticipated that porcelain-on-aluminum will replace porcelain-on-steel. Porcelain-on-aluminum is joining the curtain-wall family of architectural products to make the architect's future efforts more flexible, interesting, and satisfying.**

**At the moment, there is no telling what the percentage volume of porcelain-on-aluminum will account for. But a profitable future is predicted — both for the producer and user.**

**We at Seaporcel are currently producing several important porcelain-enamel-on-aluminum jobs and expect, in the last quarter of this year and the first half of 1959, to witness substantial increases in volume in this newer architectural product. Current Seaporcel production research and development activities are expected to lead to dramatic new approaches in porcelain-on-aluminum — definitely confirming our expectations of its wider use in the building industry.**

# safe transit

**editorial voice of the national safe transit program**

**devoted to improving packaging methods and shipping and materials handling methods for the appliance and metal products manufacturing industries. This section contains plant experience information and industry advances for the use of all executives and plant men interested in improving packaging and shipping methods and in loss prevention. The section contains complete information on the national safe transit pre-shipment testing program for packaged finished products and detailed reports of divisions and sub-committees of the National Safe Transit Committee.**

## How to Make Your Package Merchandise

"Show packaging" — and what it can accomplish — is the subject of a completely revised 32-page booklet just published by Hinde & Dauch, Sandusky, Ohio.

Titled "How To Merchandise With Corrugated Boxes," the new edition explores aspects of unified merchandising, the value of display, the selection and use of color in corrugated packaging, and the part packaging can play in special promotions. The booklet also outlines points to consider in planning a merchandising package.

Photographs of thirty individual "show packages" currently in use illustrate the new publication. Seventeen of them are in full color.

"How To Merchandise With Corrugated Boxes" is free on request to Director of Public Relations, Hinde & Dauch, Sandusky, Ohio.

## A Member Omitted

Through an oversight, Illinois Box and Crate Co. was omitted from the National Safe Transit list of certified laboratories published in the August, 1958 issue of MPM. Illinois Box and Crate is located at 811 Center St., Plainfield, Ill.

## New Handbook on Conveyor Equipment

How conveyor equipment solves materials handling problems in industry is told in a 43-page handbook just released.

Incorporated in the handbook are nearly 200 on-the-job photographs, detailed explanations and drawings which point up many specific uses for conveyors and special-accessory equipment in manufacturing, storage, and shipping operations.

A front index serves as an easy guide to the categories in which the principal features of the handbook are divided. These features are principles of a coordinated materials handling system, gravity conveyors, power conveyors, live storage conveyors, overhead conveyors, special use conveyors, accessories, wheels, and hand trucks.

In each instance where Rapistan equipment is shown, specifications and performance factors are cited. In addition, explanations and illustrations point out how Rapistan conveyor equipment is utilized by business and industry to cut costs and reduce operating time.

For your copy of the Rapistan materials handling systems handbook, write The Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids 2, Mich. Ask for Bulletin GC-58.

## Union Steel Offers New Small-Parts Container

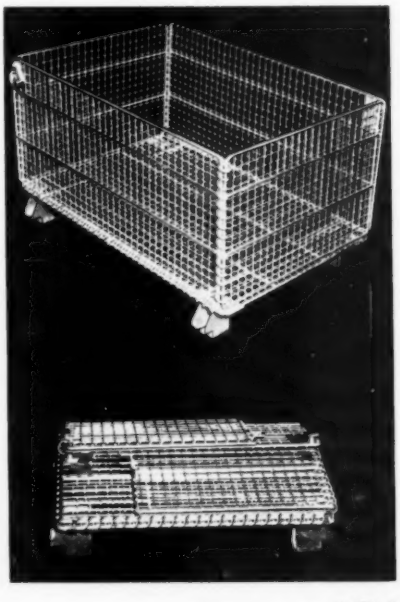
Union Steel Products Co., Albion, Mich., exclusive manufacturers of USP Palletainers, recently announced the development of a line of small parts containers which have been named Palletainer "Junior."

The new "Junior" models, immediately available in two practical standard sizes, are said to be sturdy, close-meshed, all-steel containers designed for the most efficient handling, storage, and safe transit of any small parts, assemblies, delicate products, etc. Built of reinforced welded steel wire mesh, the "Juniors" incorporate many of the outstanding construction and convenience features found only on large, heavy-duty containers.

Model 3220 is 32″ in length, 20″ in width, and 16″ high. Model 2016 is 20″ in length, 16″ in width, and 12″ high. Both have 1⅛″ mesh, and are equipped with four fabricated steel stacking-type legs welded to bottom deck. Side locks are of special steel-stamped design and loss proof.

The "Junior" Palletainers, like their larger counterpart, fold down quickly to save over 75 per cent of their open area, a feature which is said to save storage space, makes handling easier, and lowers "return" shipping costs.

Complete information, price schedules, illustrated literature, etc., is immediately available from Union Steel Products Co.



# They Care Enough to Send it in the Very Best!

ANHEUSER-BUSCH

REFRIGERATED CABINET DIVISION
ST. LOUIS, MO.

When it's the very best inside it deserves the very best outside. Anheuser-Busch, Inc. makers of America's best refrigerated cabinets, protect quality by shipping their cabinets in America's finest quality containers made by CHICAGO MILL AND LUMBER COMPANY. Quickly and Easily Assembled For Maximum Protection Without Slow-Up on the Assembly Line! Safe and High Stacking With Modern Materials Handling Equipment. Saves Valuable Storage Space. When You Care Enough To Send It In The Very Best It's Containers From Chicago Mill & Lumber Company.

*Large or Small — we make 'em all. A complete line of containers for every shipping purpose.*

**FREE!**

Illustrated catalog describing the variety of CHICAGO MILL Containers!

PALLET BOXES— Wire Bound

PALLET BOXES— Hinged Corner

Cleated Boxes

E-Z Pak Cleated Corrugated (Watkins type)

Wirebound Crates

Wirebound Boxes

Corrugated

Hinged Corner Crates or Boxes

CHICAGO MILL AND LUMBER COMPANY

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***PLANTS***

- CHICAGO, ILLINOIS
- GREENVILLE, MISSISSIPPI
- HELENA, ARKANSAS
- ROCKMART, GEORGIA
- TALLULAH, LOUISIANA

# Compact work horses solve pr

As the Hoover Company grew and expanded its plant facilities at North Canton, Ohio, the problem of materials handling was given increased attention.

Everyday problems included handling in-process parts in the manufacturing areas of the plant, moving punch press dies into and out of stamping machines, loading and unloading incoming and outgoing carriers, and work in the storage area.

There was just one problem, but it was a big one — limited space. Doorways in the plant are only 7 feet high, and aisle space is limited because of the building design.

A study of the conditions indicated that a rider-type, counterbalanced fork truck would be required. This was because the traveling distances were medium in length, and the traveling speeds of a rider-type fork truck were needed. While a walkie-type truck would do the job, its lower traveling speeds would slow down the handling operations.

According to C. L. Anthony, Hoover works manager, the smallest, lightest counterbalanced rider-type fork trucks that could be found were selected. Three trucks handle thousands of parts from receiving to production to shipping. Generally the trucks transport loads in 30-inch by 36-inch pallet boxes. Pallet boxes are used since most of the parts are small.

The trucks have traction speeds of 4 - 4.5 mph, sufficient to meet production and shipping schedules without creating a safety problem in confined spaces.

The trucks have rear-wheel drive, and are able to turn within their own length. With a 48-inch long load, they maneuver in aisles only 9¾ feet wide. With 36-inch long loads, 8¾ feet wide aisles are all that are needed.

### Only 6-foot clearance required

Of the three trucks in service, one has a 71-inch collapsed height, and the other two have 59-inch collapsed heights. With all three units, there is sufficient clearance for the truck operator's head, as well as the truck's mast, to pass under 6-foot doorways.

As another benefit of the low collapsed-height feature, the trucks deposit their loads directly into outgoing highway vehicles.

### Peg pallets for motor laminations

In handling electric motor field laminations, special "peg" pallets are used. The so-called "pegs" are a number of stakes attached to the pallets, and laminations, which have holes in the center, are placed on these stakes.

Laminations are transported from the blanking press on the "peg" pallets by a lift truck to the subsequent riveting and coil winding operations. When all work is completed, they are transformed into field coils for use in vacuum cleaner motors. The stake pallets enable Hoover to handle thousands of laminations on a single pallet neatly and efficiently.

Other component parts of vacuum cleaners are transported in the pallet boxes during and after blanking and forming operations. Generally, these loads weigh around 1,800 pounds. Since two of the fork lifts have a 2,000 pound capacity, and the third 2,500 pounds, such loads pose no problem.

In a typical operation, stampings come off the press and are dropped into a pallet box which is placed on a 4-wheel dolly. When the box is full, the dolly and box are rolled away from the press and replaced by an empty box. The loaded box is picked off the dolly and transported to the in-plant storage section by a fork lift. As required, boxes are removed from storage and delivered to a punch press for a secondary operation.

When the secondary operation is completed, items are normally shipped out on a motor highway truck to an outside warehouse for later assembling into finished products such as vacuum cleaners, fractional horsepower motors, automatic electric irons, and floor polishers.

Die castings produced by the company in zinc and aluminum are handled in a similar manner.

In use during Hoover's complete 16-hour day, 5 days per week, the trucks' batteries are removed after each 8-hour shift and replaced with batteries that have been recharged at a convenient battery recharging station in the plant.

Total power costs for operating the three electric trucks are reported as $1.33 per 16-hour shift. The company feels it has achieved efficient handling in a plant that could not have been described as "tailored" to materials handling.

*A highway trailer truck is loaded with pallet boxes of metal stampings. Despite the trailer's low ceiling, the fork lift can easily enter to deposit loads.*

MPM FEATURE

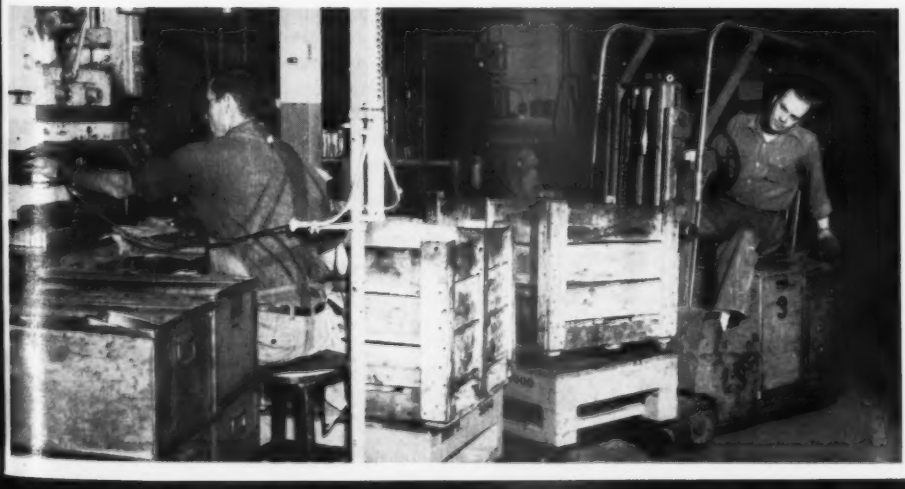
# ...problem of limited operating areas

**Hoover Company finds answer to low doorways, tight aisles, and the handling of small parts**

PHOTOS COURTESY LEWIS-SHEPARD

*(Right) — Special "peg" pallets are used to handle electric motor field laminations. The operator of the fork truck prepares to move laminations from the blanking press to the riveting area.*

*(Left) — Maneuverability in cramped quarters was a prime reason for the selection of the trucks used by the Hoover Co. Here, cannister vacuum cleaner parts are "high stacked" in storage following their initial blanking and forming.*



*(Lower left) — Electric iron sole plate covers, after going through a secondary punch press operation, are picked from a dolly by fork lift for delivery to the plating department.*

☆ ☆ ☆ ☆ ☆ ☆

## COMING FEATURES

**DESIGN**

NOISE CONTROL OF DOMESTIC APPLIANCES

STRATO FLIGHT BATHROOM SCALE

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## Presstime News

**Robert B. Algie** has been appointed Chicago district sales manager for Jones & Laughlin Steel Corp., it was announced by J. E. Timberlake, vice president - sales. He succeeds I. A. Mlodoch on the date of his retirement, October 1.

**Eustace Lingle** has been named vice president in charge of industrial sales and technical education for Oakite Products, Inc., manufacturers of industrial cleaning and metal treating compounds.

### Dow Makes Contribution to Paint Research Institute

The board of directors of the Federation of Paint and Varnish Production Clubs has announced the first contribution to the recently-formed Paint Research Institute of the Federation.

The Dow Chemical Co., Midland, Mich., has sent a sizable check to the Educational Fund of the Federation earmarked for the Paint Research Institute, the report states.

The executive director of the Institute is Dr. J. S. Long, formerly chem-

*to Page 74* →

## SUPPLIER PERSONALS

**John R. McCord** has been named to the newly-created position of director of marketing of Ferro Corp., according to Harry T. Marks, president. In his new position, McCord will be responsible for coordinating the marketing activities of the company and all of its divisions.

With Ferro since 1953, he previously held the positions of director of advertising, public relations and market research and manager of ceramic sales. Prior to joining Ferro, he was with Owens Corning Fiberglas Corp., Toledo, Ohio.

Appointment of **Pressly H. McCance,** former president of Duquesne Light Co., as an executive of Edwin L. Wiegand Co., large exclusive manufacturer of electrical heating equipment, was announced recently. He will be assistant to the president, with the principal assignment of coordinating the company's relationships with electric utilities throughout the country.

**William P. Hanks** has been appointed Midwest district manager, and **Robert M. Underwood,** Northwest district manager of the Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio.

**Edgar H. Dix, Jr.,** assistant director of research for Aluminum Co. of America since 1942, retired recently. He has been directly or indirectly responsible for the development of the majority of aluminum alloys used today, which now number 70.

**Carl H. Funk** has been appointed supervisor of the industrial engineering department of Armco Drainage & Metal Products, Inc., Stuart R. Ives, president, announced recently. Associated with Funk are **James W. Gambill,** who has been named senior industrial engineer, and **Thomas A. Danner,** who has been appointed industrial engineer.

**Thomas S. McCrory** has been appointed regional manager of Wheelabrator Corporation's West Coast sales organization. He will make his headquarters in Los Angeles, supervising the present Seattle, San Francisco, and Los Angeles territories.

## ADVERTISERS' INDEX




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## Presstime News

→ *from Page 72*

ical director of Devoe & Raynolds Co. The board of trustees is composed of: Dr. Weber, Phelan-Faust Paint Mfg. Co.; Milton A. Glaser, Midland Industrial Finishes Co.; Dr. Newell P. Beckwith, Rinshed-Mason Co.; Robert W. Matlack, G. D. Wetherill & Co., Inc., Harry Burrell, Interchemical Corp.; Ralph H. Everett, M. J. Merkin Paint Co.; Samuel U. Greenberg, United Wallpaper, Inc.; Elgin S. Nickerson, E. I. duPont de Nemours & Co., Inc.; and Garmond G. Schurr, The Sherwin-Williams Co.

A 12-page booklet describing the Paint Research Institute has been published by the Federation. Copies may be obtained from the headquarters office at 121 S. Broad St., Philadelphia 7, Pa.

### New Industrial Design Firm Formed in Toledo

Six executives from established companies have joined forces to form Design Dimensions, Inc., a new industrial design organization in Toledo, Ohio.

Officers are Harold S. Boutin, president; Cecil G. Blank, executive vice president; Robert J. Aul, F. M. Gustafson, James E. Jones, vice presidents; and Edward P. Stevens, secretary-treasurer.

The new consulting firm is geared for product, interior, package, display and furniture design, product planning and development, market research and graphic design.

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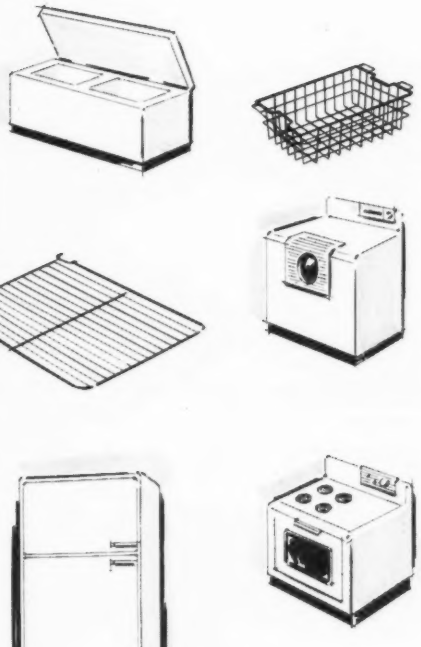

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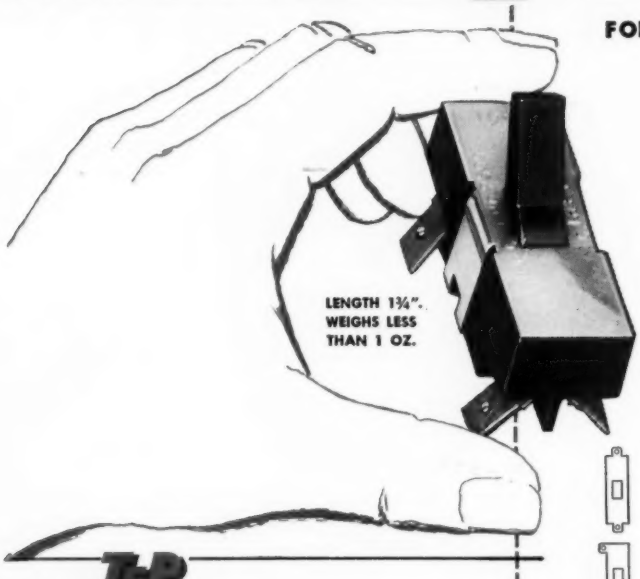


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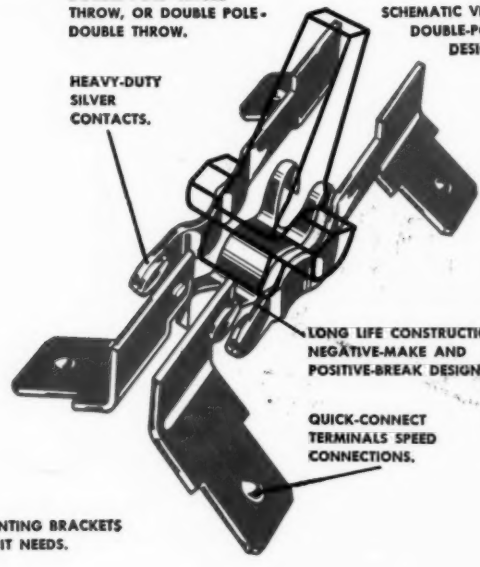


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